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# Professional education competencies of doctoral degree recipients in industrial education who teach at four-year colleges or universities

by

Yuan Hsiung Liu

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# CHAPTER I. INTRODUCTION

It should be recognized that the existence of the concept of the competency-based teacher education is controversial and much debate has ensued. However, it has been an active movement for the past several years and has generated much activity.

Rarely, if ever, has any movement swept through teacher education so rapidly or captured the attention of so many in so short a time as has the competency-based movement. Already well under way, the approach holds promise of renovating and regenerating teacher education.

One of the most frequently discussed developments in the teaching of industrial education subjects in the last decade has been the infusion of a concept commonly referred to as the competency-based curriculum. Many state boards of education and several leading teacher training institutions throughout the United States are advocating such an approach in the teaching of industrial education courses. A report on the proceedings of the Fourth Annual National Vocational-Technical Teacher Education Seminar prepared by Ohio State University (1971) presents emerging teacher education curricular models and is an indication of the rapidity in which educators are moving toward competency objectives. For three years, the faculty of the Department of Vocational and Applied Arts Education at Wayne State University has been developing and implementing the competency-based teacher education program. In September 1972,

the Department issued a booklet Competencies and Performance Objectives. In this booklet, a list of seventy-five competencies was developed for pre-service vocational teacher education and some performance objectives for professional pre-service courses.

Evidence of the magnitude of this competency-based concept in higher education is a report in a bulletin of the American Association of Colleges for Teacher Education (AACTE, 1970) which announced the formation of the AACTE Committee on Competency-Based Teacher Education. At the 1971 AACTE convention, the highest award was given to Weber State College for its competency approach. Various other colleges and universities across the country have initiated similar programs during the past few years.

The state of Texas has led the way by mandating statewide competency/performance-based teacher education (C/PBTE). The Texas State Board of Education, in June 1972, issued new teacher certification standards that required this approach to be undertaken by all sixty colleges and universities in the state with teacher preparation programs. Sandoz (1974) stated,

> Basic to the 1972 certification standards was the unequivocal demand that all institutions and faculties commit themselves to C/PBTE. This was a threshold precondition to any consideration whatever of any universities request that the Texas Education Agency approve any program (undergraduate or graduate) for the preparation of teachers (p. 304).

Numerous articles and discussions have represented a variety of views about the need for a competency base in

industrial teacher education for the past several years. Several teacher educators pointed out the weaknesses of the course lists and grades traditionally used as an assessment of a teacher's preparation and the strengths of the C/PBTE program. Houston and Howsam (1972) indicated,

> As has long been known, the course lists and grades traditionally used as an assessment of a teacher's preparation are extremely nebulous in meaning. The nature of an "Introduction to Education" course varies widely from college to college-indeed from instructor to instructor within a single college. Some instructors rarely and grudgingly grant an "A" in this course; for other instructors, an "A" is the typical or modal grade. We delude ourselves if we consider an "A" in "Introduction to Education" as a reliable or valid sign of any particular ability or achievement demonstrated by a preparing teacher (p. 8).

Even if course grades could be made valid and reliable, they still would suffer from two flaws that are inherent in this approach. Houston and Howsam (1972) added,

> First, the grade obscures variations within the expected competencies; strength in one competency may compensate for weakness in another. Clearly, the profession is not protected adequately by such evaluations. The second inherent flaw is the use of norm-referencing, which appears to greater or lesser degree in most traditional courses. An individual's grade is affected by the performance of others in his class or in the norming population with which he competes (p. 8).

To support the above statements of Houston and Howsam, Jones (1972), of the University of Houston, stated,

> Course-by-course development results in a program of uneven quality. Graduates of a teacher-education program usually can identify some courses that have

> had the most impact on their effectiveness. However, even if all courses in the program were effective, there still would be gaps and overlaps among courses. Unfortunately, there have been few systematic attempts to alleviate discontinuity among courses in most teacher-education programs. Few teacher educators have attempted to view the totality, the gestalt, of teacher-education programs. The search for this totality is the heart of the competency-based movement (p. 104).

To further support the above viewpoints expressed by Houston, Howsam, and Jones, Lindsey (1973) believed, "That a number of courses completed and grades received in a university program do not guarantee competence to teach, needs no argument (p. 189)."

A program that is competency-based is criteria-referenced; that is, the criteria for training and the objectives are made explicit, and prospective teachers are held accountable for meeting them. Traditional programs are criteria-based to the extent that prospective teachers are held accountable for the accumulation of credits taken in specific courses. Most of the new competency-based programs do not organize their curricula in terms of courses but in smaller units called instructional modules. Each of the modules contains objectives and the criteria for their achievement. These are unambiguously specified, and a teacher's competency can be measured against them. Thus, demonstrated proficiency on specific criteria rather than whether or not the trainee has taken a particular course becomes the important

consideration.

The use of specifically stated competencies as a basis for teacher preparation has far-reaching consequences. According to Dodl and Schalock (1973), among the important changes that would occur are the following:

> Teacher preparation would become a noncourse, noncredit enterprise. Courses and credits have always been tied to a time base. Successful demonstration of competencies is in no way tied to time; in fact, it is theoretically possible to demonstrate all competencies without spending any time in an instructional program (p. 47).

Competency-based teacher education has been described as "the most significant lever for educational reform since Sputnik" (Schmieder, 1973, p. 36), and as "one of the most influential and important developments in this progressive effort to advance the process of schooling" (Smith, 1973, p. vi). It has also been referred to as a "multifaceted concept in search of practitioners," "old wine in new bottles," and "a good idea if you could figure out what it is." In whatever manner competency-based teacher education is being referred to, and whatever is being said about it, there is little doubt that it is being widely talked and written about, and attempts to implement it are increasing as this national movement gains momentum.

In view of the rapid growth of the movement, it is appropriate at this time to look at what the competencies of a successful teacher are. Cooper and others (1973) said,

"Specification of teacher competencies is a most crucial aspect of designing a competency-based teacher education program (p. 17)." The identification of teacher competencies is the first step of developing a competency-based model. As Maxwell (1974) stated,

> The basic competency-based model consists of three logically sequential steps. First, we stipulate, (identify, develop), in behavioral terms, the competencies (behaviors, skills, abilities) of a successful teacher. Second, we devise measures (assessment device) to ascertain the degree to which the student possesses these competencies. Third, we design a program which demonstrably produces these competencies (p. 307).

Universities which have a responsibility for the preservice and in-service preparation of four-year college/university industrial education instructors must identify the tasks or competencies needed by the instructors as a first step in the preparation of relevant instructional objectives. Fritschel (1967) indicated that one of the four areas of desirable competence was that "The teacher must develop professional competency in carrying out his changing role (p. 348)." The present study was designed to inquire into the process and content of industrial education doctoral degree curriculum development by focusing on one major problem area--the identification of professional education competencies and proficiency requirements of doctoral degree recipients in industrial education who teach at four-year colleges or universities.

## Statement of the Problem

The problem of this study was two-fold.

1. To identify the important professional education competencies of doctoral degree recipients in industrial education who teach at four year colleges or universities.
2. To analyze and compare the extent of agreement of each of the twenty-two factors (pp. 115-122) encompassing selected professional education competencies identified in this study by instructors teaching predominantly undergraduate courses, those teaching predominantly graduate courses, and department heads who have received doctoral degrees in industrial education and who teach at four-year colleges or universities.

## Purpose of the Study

The purpose of this study was:

1. To contribute to a better understanding of the professional education competencies which have been identified as important by various authors in the literature.
2. To contribute to a better understanding of the important professional education competencies

needed for doctoral degree recipients in industrial education.

The study was designed to answer the following two questions:

1. What are the important professional education competencies of doctoral degree recipients in industrial education?
2. Are there significant differences at the .05 level of confidence in the judgments of the three groups of instructors as to each of the twenty-two factors encompassing selected professional education competencies identified in this study?

## Need of the Study

While considerable attention has been given to the competencies of prospective teachers at the undergraduate level of preparation, there has been an insufficient attention given to the competencies of prospective teaching personnel at the advanced degree levels of preparation. In the last decade, some colleges of education have moved toward competency-based teacher education programs. Several persons advocating the identification of competencies to improve teacher preparation have made statements that render support for this study.

According to Rosner (1973), Dean of the College of

Education, Temple University:

> Competency-based teacher education is the catalyst that can revitalize the teacher education enterprise by inviting and demanding an evaluation of individual and institutional effectiveness at every level (p. 26).

Fritschel (1967), Head, Department of Education, Western Illinois University, and Chairman, Illinois Educational Association Commission on Teacher Education and Professional Standards, stated that: "Competencies must be defined in terms of what the teacher does, what action he performs, what role he plays, and how he carries out his responsibilities (p. 347)." He added, "Teacher education programs must be competency-based (pp. 347-48)."

Nash and Agne (1971), of the University of Vermont, stated, "It is believed that the competency movement in teacher education has been but one response to the preparation of teachers (p. 156)." Nash (1970), also stated,

> For a multiplicity of complex reasons, colleges of education around the country are adopting a competency-based model for professional training (p. 243).

He further stated:

> More and more colleges of education are moving toward a competency model in teacher education. This commitment to competency is usually buttressed by the following assumptions: ...the performance of competency curriculum is rooted in a set of very clear objectives. This competency curriculum provides knowledge and develops skills to reach those objectives. Also, it systematically measures its effectiveness by checking on how well its trainees are fulfilling the objectives. ...The ultimate goal

> of this competency curriculum is to produce the teacher who has mastery of specific professional competencies (p. 240).

According to a report of a National Research Planning Conference in Technical Education held on January 10-11, 1967:

> With regard to preparation of teachers, the profession needs to know the characteristics of a good technical teachers; that is, the skills, knowledge, attitudes, and abilities needed by this successful teacher. With these data in mind it might be possible to devise developmental pilot programs designed to develop these desirable skills and competencies in the potential teacher (Miller, 1967, pp. 22-23).

## Objectives of the Study

The objectives of this study were two-fold.

1. To identify which professional education competencies needed by doctoral degree recipients in industrial education were rated as important by the judgments of the total respondents and the respondents of each of the three groups of instructors.
2. To analyze and compare the judgments of the three groups of instructors regarding each of the twenty-two factors encompassing selected professional education competencies identified in this study.

## Hypothesis

The hypothesis formulated and tested in this study was as follows:

It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning each of the twenty-two factors encompassing selected professional education competencies identified in this study. This general hypothesis was tested through twenty-two sub-hypotheses.

## Assumptions

The following assumptions were made in pursuit of this study:

1. Accurate, objective, and unbiased answers were provided by the respondents to the questionnaire.
2. The items of the questionnaire were representative of the abilities on which competency was needed for success by industrial education instructors at four-year college and university levels.

## Limitations

The following limitations were observed in this study.

1. The study was limited to the industrial education instructors at four-year colleges or universities. These instructors have earned doctoral degrees

from universities offering industrial education doctoral degree programs during the period September 1, 1968 and August 31, 1973.

2. The questionnaire used to determine the professional education competencies was developed solely for this study and therefore validity and reliability data were not previously available. Reliability of the scale and subscales was computed with the population of this study.
3. The selection of all relevant competencies included in the questionnaire was impossible, although the competencies selected were based upon recommendations from the related literature, a jury of experts, and some of the respondents selected for field-testing of the questionnaire.

## Definition of Terms

Certain terms used throughout the context of this study were defined as follows:

Industrial education -- Various types of education of an industrial nature, such as vocational industrial education, industrial arts, and technical education (Good, 1959, p. 285).

Industrial education instructor -- An individual who has earned a doctoral degree in industrial education and teaches course(s) in industrial education in a four-year college or

university at undergraduate and/or graduate school level.

Professional education competencies -- The knowledge, abilities, understanding, and expected behaviors in areas other than technical fields which enable industrial education instructors at four-year colleges or universities to be successful in their teaching endeavors and related activities, and to advance in their teaching positions (Erpelding, 1972, p. 13).

Competency-based teacher education program -- A competency-based teacher education program specifies the competencies to be demonstrated by the student, makes explicit the criteria to be applied in assessing the student's competencies, and holds the student accountable for meeting those criteria (Cooper and Weber, 1973, p. 14).

Proficiency -- The level or degree of expertness required in the performance of a professional education competency (Gunderson, 1971, p. 5).

Questionnaire -- A list of planned, written questions related to a particular topic, with space provided for indicating the response to each question.

# CHAPTER II. REVIEW OF LITERATURE

Studies have been identified in the area of competencies needed by teachers of industrial education, vocational education, other fields of education, and education in general studies. These studies could be categorized under three levels of educational programs, that is, doctoral programs, undergraduate teacher programs, and post-secondary teacher preparation programs. The post-secondary teacher preparation programs referred primarily to the concept that they were designed to prepare the students competently enough to teach vocational-technical courses at the community colleges or junior colleges after their graduation.

An ERIC search was conducted using keywords relating to the purposes of this study. A large number of sources were provided through the Iowa State University Library reference facilities. Each of the referenced journal articles and books was screened and those with apparent specific relationship to this study were reviewed.

The literature reviewed and included in Chapter II of this study was classified under the following four major headings:

1. Doctoral programs relative to competencies
    a. Doctoral programs in industrial education
    b. Doctoral programs in other fields of education

2. Undergraduate teacher programs relative to competencies
    a. Undergraduate teacher programs in industrial education
    b. Undergraduate teacher programs in vocational education
    c. Undergraduate teacher programs in general studies
3. Post-secondary teacher preparation programs relative to competencies
4. Summary

The first three major headings listed above represent research studies which were related to the present study with respect to purpose, method, population, or subject matter field. The purposes, objectives, methods, findings, and/or selected conclusion of the studies were abbreviated to include only those portions most directly related to this study. The studies included under the first three major headings listed above were arranged in chronological order by yearly dates.

## Doctoral Programs Relative to Competencies

This section includes two subheadings. They are: (1) Doctoral programs in industrial education; and (2) Doctoral programs in other fields of education. The research studies pertinent to each of the two subheadings were discussed

respectively as follows:

Doctoral programs in industrial education

Ginther (1964) conducted a study at the University of Missouri to ascertain in what ways and to what extent specialized teaching, administrative, and technical competencies were being provided for and developed in industrial education graduate programs in the United States. Data for the study were secured through information forms, furnished materials, and college catalogs from 86 colleges and universities.

Ginther concluded that graduate students of industrial education had sufficient opportunities to develop teaching and administrative competencies in industrial education and sufficient opportunities in professional education courses to further develop teaching and administrative abilities. However, at the doctoral level there appeared to be insufficient time for graduate students to develop any specialized technical competencies. Thus, an increased number of provisions for developing specialized technical competencies are probably needed. It revealed from his analysis that teaching experience before granting the doctoral degree was a requirement which was generally recognized and an accepted practice for industrial education.

In 1969, Nielsen completed a study at Colorado State

College. He sent information forms requesting general data to department chairmen of existing doctoral degree programs in industrial education. From the data he concluded that as far as curriculum pattern is concerned, percentages of doctoral programs devoted to developing professional, technical, research, and general education competencies were strikingly similar. Nielsen (1969) stated,

> The approximate pattern of emphasis in all areas of industrial education combined was: Professional, 52 per cent; technical, 8 per cent; research, 25 per cent; and general education, 15 per cent (p. 137).

Definite patterns of the relative emphasis toward developing these competencies at the doctoral level emerged. Nielsen (1969) indicated,

> The Ph.D. program was definitely "research oriented" as against preparation for teaching, administration, and/or supervision for the Ed.D.... This was consistent in all three areas of industrial education... conversely, the percentage of time devoted to technical competencies was higher in Ed.D. programs than in Ph.D. programs. Very little percentage differences existed between Ed.D. and Ph.D. programs in professional or general education competencies (p. 136).

Pershing (1970) conducted a study at the University of Northern Colorado to identify criteria regarding important requirements, practices, and procedures for evaluation of existing industrial education doctoral programs and also for guidance in the development of new doctoral programs. One of the suggestions for the programs was as follows:

Some areas of study recommended other than the traditional industrial education courses such as history of industrial education, philosophy of industrial education, curriculum and laboratory planning, to include "computer programming and data processing, conference procedures, and materials of industry" (Pershing, 1970, p. 125). These areas might be considered relatively new to industrial education and would enable a doctoral student to strengthen his professional competencies.

Doctoral programs in other fields of education

In 1962, Doty made an appraisal of the program leading to the Doctor of Education degree at Indiana University by means of a follow-up study of its graduates. The study was based on the selected experiences of 445 graduates who received their degrees during the years 1950 to 1960. This study had two major purposes: (1) To evaluate the quality and effectiveness of the program leading to the Doctor of Education degree; and (2) To make recommendations for the strengthening of that program.

One of the five major aspects of Doty's study was the judgments of the graduates regarding a list of competencies, their usefulness in the graduates' present positions, their appropriateness in the graduate program, and the degree to which they were acquired during the graduate program. There

were 8 competencies listed in the questionnaire of Doty's study. They were as follows:

1. Ability to locate, read, interpret and apply research to educational problems;
2. Ability to design and carry on research;
3. Ability to organize and communicate ideas and information by effective writing;
4. The ability to exert leadership in matters of professional and community cooperation;
5. An understanding of your major area of specialization;
6. Knowledge of your minor area of specialization in education;
7. Knowledge in your minor area outside the education field; and
8. Ability to use and interpret statistical data and procedures (Doty, 1962, p. 188).

Respondents were asked to indicate the usefulness of each of the above 8 competencies by checking one of three responses, "constantly used", "often used", or "seldom used". Seventy-six per cent or more indicated that all except the ability to design and carry on research, and knowledge in the minor area outside of education were constantly or often used.

Respondents were asked to rate the extent to which their doctoral program at Indiana University contributed to each of the competencies. Sixty-five per cent or more of the respondents rated the contribution to each ability or

competency as "excellent" or "good", with the exception of (1) the ability to exert leadership in matters of professional and community cooperation and (2) the ability in the minor area outside of education.

Respondents were further asked to indicate which of the list of eight competencies should be acquired during doctoral work, regardless of whether they had been acquired during doctoral study. Seventy-eight per cent or more indicated that all competencies except ability in the minor area outside the education field should be acquired during doctoral study.

## Undergraduate Teacher Programs Relative to Competencies

This section consists of three subheadings. They are: (1) Undergraduate teacher programs in industrial education; (2) Undergraduate teacher programs in vocational education; and (3) Undergraduate teacher programs in general studies. Several research studies pertinent to each of the three subheadings were delineated as follows.

Undergraduate teacher programs in industrial education

Silvius and Ford (1965) completed a study at Wayne State University to determine practices and policies essential to keep industrial education teachers of Michigan qualified within their evolving technical areas of specialization. Silvius and Ford stated.

> The problem called for...the formulation of selected proposals (based on findings) that might be submitted to selected foundations or government agencies supporting educational research for their help with an action program directed at improving the competence of Michigan's industrial education teachers (p. 1).

An interview form was developed to get the opinions of 56 people who were (1) representatives of business, labor, community colleges, and technical institutes, (2) professors of industrial education, (3) teachers, (4) counselors, and (5) administrators. There were 29 questions in the interview form, 20 pertaining to curriculum and 9 pertaining to teacher competence.

On the basis of data collected and shown in summary form for each question, eight proposals for an action program were drafted. These included a program at Wayne State University Applied Management and Technology Center to update and extend industrial teacher competency.

Ray (1966) conducted a study at Michigan State University

to make an analysis of the classroom and laboratory instructional function of engineering technology instructors in Michigan Community Junior Colleges through the use of reported critical incidents. In addition, it sought to discover behaviors used most frequently and effectively in teaching.

The population included in this study was taken from the total population of Michigan Community College instructors teaching in the areas of mechanical-industrial, drafting-design, and electricity-electronics technology. From a total population of sixty-eight instructors, thirty-two were represented in the study.

The following were findings regarding curriculum development in technical teacher education:

1. The Instructional Grid developed in this study identified areas of instructional behavior that should be considered in curricula for the preparation of technical instructors;

2. Technical instructors have varied backgrounds of preparation and experience. But, they also have certain competencies in common; and

3. To capitalize and build upon these competencies, in-service and university programs of teacher preparation should provide for considerable flexibility (Ray, 1966, p. i).

Gianini (1968) conducted a study at the University of Florida to determine if the professional competencies of teachers of technical education were a function of a number

of educational background variables. Also, the study attempted to provide basic data from which indices predictive of professional competencies of teachers of technical education might be derived.

The subjects used in the study comprised the entire population of teachers of technical education in the State of Florida during the 1966-67 academic year. The total number involved was 106.

It was concluded from this study that relatively few educational factors actually contribute greatly to the professional competencies of teachers of technical education. Furthermore, it was concluded that those factors which differentiated between groups of teachers of technical education in various educational phases and levels were not entirely conclusive.

James Miller (1971) completed a study at the University of Northern Colorado to identify functional competencies needed by instructors who teach in contemporary industrial arts programs and to rank these competencies in order of importance. He developed an opinionnaire composed of a list of 75 functional competencies. The opinionnaire was then evaluated by a jury and sent to 560 industrial arts teacher educators and supervisors throughout the United States, Canada, and the District of Columbia. Each competency in the opinionnaire could be checked for one of five values

ranging from "most important" to "of no importance". The rank order of the competencies was determined by the mean value of importance for each competency. This procedure was followed for both teacher educators and supervisors.

The following conclusions were drawn, based on the findings of the study:

1. The functional competencies identified in this study can be used effectively to aid industrial arts teachers, teacher educators and supervisors in the identification and selection of important competencies needed to adequately perform in contemporary industrial arts laboratory/classrooms.

2. Competencies pertaining to personal qualities and behavioral characteristics should be stressed above all others in teacher training programs. There should be valid methods and techniques devised to help screen prospective industrial arts instructors in order to determine if they possess these important personal qualities and characteristics.

3. It is important that the functionally competent instructor spends some time in organizing group projects and mass production units, but the majority of his instructional time should be spent in providing situations which allow students to think and work independently in an environment conducive to the development of creative abilities (Miller, 1971, pp. 151-153).

Popovich (1973) conducted a study at Wayne State University to validate a listing of selected teaching competencies for industrial teacher education. Sixty-one practicing industrial education teachers on the secondary level were interviewed in person.

Five major objectives were achieved in the study. They were:

1. Teaching competencies identified for vocational and applied arts teacher education were validated for industrial teacher education;

2. Teaching competencies ranked important by experienced and less experienced industrial education teachers were identified;

3. The degree of utilization of the teaching competencies was determined;

4. Differences in teaching competencies ranked important by industrial education teachers whose programs were exploratory and industrial education teachers whose programs were vocational were examined; and

5. A rank order of the teaching competencies was determined (Popovich, 1973, p. 65).

The following conclusions were drawn in Popovich's study:

1. The listing of 75 teaching competencies for Vocational and Applied Arts Education is a valid listing of teaching competencies for industrial teacher education;

2. Some teaching competencies are more important for the preparation of pre-service industrial education teachers than other teaching competencies;

3. Industrial education teachers, regardless of the number of years of teaching experience, can identify teaching competencies needed by the pre-service industrial education teacher;

4. Teaching competencies can be identified as being interdisciplinary;

5. The ranking of the teaching competencies were the same regardless of the university attended;

6. Teaching competencies needed for the industrial education teacher are the same regardless of the type of program he teaches; and

7. Experienced industrial education teachers and industrial education teachers with less experience utilize teaching competencies to the degree that they are needed to perform as an indistrial education teacher (Popovich, 1973, pp. 70-73).

Undergraduate teacher programs in vocational education

Walsh (1960) identified 107 competencies required by trade and industrial education teachers and appraised the relative importance of the competencies by using a Likert-type check list. According to successful teachers, state and local supervisors, and teacher educators, the most important competencies of trade and industrial teachers were:

1. The ability to develop student attitudes toward safe practices and safety-consciousness in job performance;

2. The ability to stimulate and maintain interest throughout the instructional process;

3. A knowledge or understanding of safe practices in teaching the operation of industrial equipment;

4. The ability to develop appreciation of good workmanship;

5. The ability to demonstrate the skills of the trade; and

6. A knowledge or understanding of methods and/or techniques of teaching shop subjects (Walsh, 1960, p. 17).

Crawford (1967) conducted a study to provide a basis for a competency approach in distributive education curriculum development. In her study, respondents identified 179 critical tasks for high school distributive education teacher-coordinators. Crawford (1967) made the following recommendations:

> Further research is needed to determine the best way to develop competencies (professional and technical) needed by the distributive education teacher-coordinator to effectively conduct a distributive education curriculum.... Studies should be made concerning the job of the post-secondary teacher-coordinator, the state supervisor, the teacher educator, and the adult instructor (p. 3).

Cotrell (1971) served as the principal investigator in the "Model Curricula for Vocational and Technical Teacher Education Project" which was designed to develop, implement, and test curricula for the preparation and in-service education of all occupational service areas of vocational-technical teachers. As part of this project, the pedagogical aspects of teaching were studied to determine the performance requirements of teachers in each of the occupational areas including technical education. The staff conducted a career analysis of vocational teachers in the seven occupational areas. The study resulted in the identification of 390 performance elements or competencies. Cotrell (1971) concluded,

> Some of these competencies were unique to an occupational area or a few areas. Some were unique to teacher-coordinators of cooperative programs regardless of their occupational area affiliation. Some were common to all vocational-technical teachers (p. i).

The Division of Vocational, Adult, and Community College Education (1970) at Oregon State University completed a competency-oriented individualized continual progress vocational teacher education project. The Division stated that the purpose of this project was to build an empirically-based training program that is validly related to those tasks that the beginning teacher will find himself confronted with in the actual teaching-learning process.

Outcalt (1971) completed a study at the University of Cincinnati to investigate the roles of the local supervisor of trade and industrial education, the state trade and industrial teacher educator, and the trade and industrial teacher in terms of their respective responsibilities for improvement of instruction, as perceived by local supervisors, teacher educators, and experienced trade and industrial instructors. Under investigation, also, was the possibility of overlaps, omissions, or role conflicts in the concepts of the trade and industrial teacher education process.

The research method used was a comparison study, with data collected by a mailed questionnaire. The questionnaire contained 100 teacher competency statements and the

respondents were asked to identify major responsibilities for development of each competency in the new teacher, both before and after issuance of the first provisional teaching certificate. Questionnaires were mailed to all of the local supervisors (73) and all of the teacher educators (31) in Ohio, and to a sample of experienced instructors equal in number to the local supervisor population.

Analysis of the data resulted, in part, in the following findings:

1. Local supervisor, teacher educator, and experienced instructor respondent groups agree upon major responsibility assessments for 70 of 200 competency designations (two designations for each item) at a 60% cutoff level.

2. There is a lack of agreement at the 60% cutoff level concerning responsibility assessment for 32 competencies. None of the respondent groups achieved a 60% figure for 28 competencies before or four competencies after issuance of the first provisional certificate, indicating role conflict in terms of role expectations within respondent groups for these competencies (Outcalt, 1971, pp. 69-70).

The Department of Vocational and Applied Arts Education (VAE) at Wayne State University identified a list of competencies for pre-service vocational teacher education programs, and performance objectives for professional pre-service courses in 1972.

Seventy-five competencies have been identified as the basis of the VAE pre-service (or pre-certification) program. The 75 competency items were organized into the

following seven categories:

1. Plan (items 1-19);
2. Instruct (items 20-30);
3. Evaluate (items 31-37);
4. Guide (items 38-48);
5. Manage (items 49-58);
6. Public and human relations (items 59-63); and
7. Professional role (items 64-75);
(VAE, 1972, p. 728-3 and pp. 728-4, 728-10).

The performance objectives were described as:

> The vehicles by which the competencies are acquired and demonstrated within the instructional units. The mastery of several performance objectives would enable the student to demonstrate a competency. Thus, the competency is general and program-related and the performance objectives are specific and course-related (VAE, 1972, p. iv).

Millán-Sambolín (1972) completed a study at the Louisiana State University and Agricultural and Mechanical College to determine the technical and professional training needs (competencies) of the prospective vocational agriculture teachers in Puerto Rico.

The Descriptive Survey Method, with the Group Interview Technique, was used in this study. Questionnaires providing for the evaluation of the undergraduate teacher education at the University of Puerto Rico, and the evaluation of 143 technical and professional competencies in vocational agriculture teacher education were provided. Three professional

educator groups, i.e., teachers of vocational agriculture, supervisors of the vocational agriculture program, and teacher educators at the University of Puerto Rico participated in the study.

The findings, in part, of this study were indicated as follows:

1. Most of the teachers, supervisors, and teacher educators favor a revision of the undergraduate teacher education curriculum at the University of Puerto Rico so as to provide for: (1) more flexibility in the technical education courses, (2) higher competency in the professional and technical areas, and (3) the attraction of more students majoring in agricultural education.

2. In the judgment of the teachers, the supervisors, and the teacher educators, the 143 professional and technical competencies studied were of considerable importance for the development of the vocational agriculture program in Puerto Rico, but the prospective teachers entered the teaching profession competent in only 59 per cent of those competencies.

3. Professional background characteristics of the teachers, i.e., (1) teaching experience, (2) teaching program, (3) professional experience other than teaching, and (4) general undergraduate grade-point index, had a significant influence on the responses of the teachers as to: (1) "competency acquired," (2) "importance of competency acquired," and (3) additional training needed in some of the professional and technical areas of the undergraduate curriculum (Millán-Sambolín, 1972, p. iii).

Undergraduate teacher programs in general studies

The California Teachers Association (1964) conducted a number of studies in the area of teacher competence and have identified and analyzed six teacher roles: Director of Learning, Counselor and Guidance worker, Mediator of the Culture, Link with the Community, Member of the State, and Member of the Profession.

This report states a need for the identification of the personal qualities necessary for competent performance of all the teacher roles. In practice, these characteristics fall into two general categories:

1. Those scholarly abilities necessary for success in college work, such as intellectual achievement, reading skills, and adequate study habits.

2. The personal attributes essential for success in performance of the teacher roles. These include emotional maturity, interest in children and some of the other commonly accepted qualities (p. 50).

The report concluded that the leadership responsibility of the teacher education institution was clear and inescapable. Essentially this institution is the heart of the profession. It is responsible for activities in the field as well as for the preparation of competent practitioners.

Johnson and Shearron (1969) in building a teacher education program stated,

> By defining what the job actually is, the competencies necessary to perform specific tasks may be adequately determined. In other words, it would logically follow that the content of a teacher education program should be based on the teaching act itself. Studies of teaching and teaching behaviors provide a partial base on which to build (p. 2).

## Post-secondary Teacher Preparation Programs Relative to Competencies

Wattenbarger, (American Association of Junior Colleges, 1969) chief architect of Florida's burgeoning community college program, found amidst the variety of views certain "Commonalities": superior two-year college teachers must develop competence in subject matter, competence in teaching skills, a sensitivity to students, and experience and understanding of their roles.

Wroot (1970) designed a study at The University of Alberta to determine the need for pedagogical training as perceived by practicing instructors and academic administrators in post-secondary technical and vocational education at the two Alberta institutes of technology. Competencies determined important to an instructor were: communication skills; classroom, laboratory, and shop organization and management; testing and evaluating techniques; and the development and maintenance of discipline in class.

Feck (1971) completed a study at the Ohio State University. The major objectives of Feck's study were:

1. To identify educational and occupational characteristics of technical teachers of agriculture and administrators of agricultural technology programs in two-year technical institutes or colleges in the United States;

2. To identify perceptions held by teachers, administrators, and state supervisors of vocational agriculture concerning the importance of 117 professional education competencies;

3. To determine the teacher's degree of proficiency in each of the competencies; and

4. To explore relationships and compare responses within and between groups surveyed (Feck, 1971, pp. 3-4).

Data were obtained from a stratified random sample of two-year institutes or colleges in the United States offering agricultural technology curriculums. There were 261 participants, including 160 technical teachers of agriculture, 69 administrators of agricultural technology programs, and 32 state supervisors of vocational agriculture.

Most of the 117 professional education competencies studied were perceived as above average in importance by the respondents as a qualification for being or becoming a successful technical teacher of agriculture. Competencies within the areas of planning for instruction, teaching, and public and human relations were most frequently rated highest in importance. Competencies within the areas of

student organizations and teaching related to the newer audio visual aids were most frequently rated lowest in importance.

Teachers rated their degree of competence lower than they rated the importance of most professional education competencies. Full-time technical teachers of agriculture as well as those with pedagogical preparation perceived the importance of and their degree of competence in professional education competencies higher than those without these experiences and backgrounds.

Gunderson (1971) completed a study at Oregon State University in which there were three purposes:

1. To determine if significant differences existed among the competency mean scores for the community colleges included in the study;
2. To determine the common professional education competencies needed by community college instructors of trade and industrial subjects; and
3. To determine the extent of resemblance among trade and industrial instructors according to values given 99 professional education competencies (Gunderson, 1971, p. 3).

A mail survey questionnaire was developed to collect data. The 99 item questionnaire was designed so that instructors could respond to the level of proficiency necessary for each competency in relation to their job. Their responses consisted of indicating whether no, slight, moderate, considerable, or complete competency was needed.

A total of 40 community colleges, ten in each of four states (California, Colorado, Oregon, and Washington), were selected for the study. The sample of 160 instructors was obtained by randomly selecting four trade and industrial instructors from each of the community colleges identified as the population. Data were analyzed by utilizing analysis of variance and factor analysis techniques.

The findings, in part, of this study were summarized as follows:

> A one-way classification analysis of variance revealed that, except for one competency, no differences existed among community colleges according to scores that trade and industrial instructors assigned to each of 99 professional education competencies.... The R-technique of factor analysis showed that nine of the ten highest mean-ranked professional education competencies in the study clustered under Instructional Strategies.... The highest mean-ranked competency in the study was to motivate students in the classroom, shop, and laboratory and the lowest mean-ranked competency in the study was to interpret the history of education.... The Q-technique of factor analysis revealed that trade and industrial instructors from the four different states resembled one another with regard to values assigned to professional education competencies (Gunderson, 1971, pp. 57-59).

In 1971, Lindahl completed a study at Oregon State University to determine the common professional training needs and proficiency requirements of selected community college vocational instructors of agriculture, health, home economics, and service occupations. The study was

accomplished through the construction, validation, and utilization of a professional education competency mail-survey questionnaire of 99 competencies with a five point Likert-type scale.

The collected data were analyzed by analysis of variance to test for differences among community college mean scores. The major data analysis in this study utilized the R-technique factor analysis which identified the common professional education competencies. The Q-technique was also conducted on the data to determine the extent of resemblance among instructors according to the ratings given to the competencies.

The following conclusions were drawn in Lindahl's study:

1. Generally there were no significant differences among the community college professional education competency mean scores in the four different states included in this study;

2. The 160 community college vocational instructors of agriculture, health, home economics, and service occupations resembled one another in terms of how they responded to the professional education competencies in the study;

3. The common professional education competencies identified in this study verify that the professional education competencies needed by instructors within the vocational program areas represented in this study may logically be offered in a common teacher training effort; and

4. Clusters of common professional education competencies have a logical relationship to one another.... Factor 1, entitled Instructional Management, was rated by the respondents as requiring the highest levels of proficiency.... In contrast, respondents rated the Factor II (Program Management) competencies as requiring the least proficiency (Lindahl, 1971, pp. 46-47).

Jack Miller (1971) conducted a study at Oregon State University to determine the professional education competencies of selected community college vocational instructors. Respondents in the study included instructors of business and distributive education.

A mail survey questionnaire containing 99 professional education competencies together with a five-point Likert-type scale was used for the study. The study's population utilized the four western states of California, Colorado, Oregon and Washington. Forty community colleges, ten in each of the four states, were arbitrarily selected.

The sample for the study consisted of four randomly selected business or distributive education instructors from each of the community colleges identified in the population. Hence, the total sample consisted of 160 respondents.

The following specific conclusions were a result of this study:

1. Community college instructors of business and distributive education were alike or resembled one another in their responses to the competencies contained in the instructor questionnaire;

2. Professional education competencies which clustered under the factors of Instructional Management and Teaching-Learning Process were judged by instructors to require a high level of proficiency;

3. The ten professional education competencies requiring the highest level of proficiency when ranked according to mean scores are all competencies which may be considered to be directly related to effective instruction; and

4. The ten competencies which ranked lowest according to mean scores were ones which were not directly related to the instructional process (Miller, 1971, pp. 52-53).

Erpelding (1972) completed a study at Kansas State University to ascertain the professional education competency needs of post-secondary occupational education teachers in Kansas. The occupational areas represented were: agricultural education, business and office education, distributive education, health occupations, home economics, and trade and industrial education.

The study involved the identification of 45 professional education competencies considered useful and necessary for post-secondary occupational education teachers. A research instrument was developed to allow respondents to rate level of proficiency required, proficiency attained, and designate the type of educational setting where proficiency in the competency might best be attained.

Four statistical techniques were employed to test four hypotheses established in pursuit of the study. They were:

(1) Analysis of Variance; (2) Tukey's Multiple Comparison; (3) T-test for Related Samples; and (4) Chi Square Test of Independence.

Four findings were obtained in this study:

1. There were a large number of similarities in the levels of proficiency required by post-secondary occupational education teachers in regard to the 45 professional education competencies;

2. The level of proficiency possessed by post-secondary teachers in different occupational areas was similar for the majority of the 45 competencies;

3. All occupational areas needed in-service education. The post-secondary occupational education teachers perceived their in-service education needs as being equally disbursed among "Planning for Instruction." "Implementing Instruction," and "Evaluating the Instruction" competencies; and

4. Teachers among the six occupational areas agreed in most instances about the types of educational settings in which the 45 competencies could best be attained. However, the researcher concluded that there was considerable disagreement by teachers within each occupational area (Erpelding, 1972, pp. 104-105).

Spaziani (1972) completed a study at Oregon State University to determine the hierarchical structure of the cognitive domain within 99 common professional education competencies for community college and secondary school vocational instructors. Findings were to be used in the construction of curricula relevant to vocational teacher preparation programs.

Data were gathered by a survey-type instrument

originally designed for mailing, but modified for personal administration to a total of 94 respondents in Oregon's 12 community colleges and 13 randomly selected secondary schools. The instructor questionnaire contained 99 professional education competencies developed by Gunderson (1971), Lindahl (1971), and Miller (1971). A six-point ordinal scale corresponding to the major headings of Bloom's cognitive taxonomy was added for this study. Competencies clustered under Instructional Process and Preparation for Instruction were judged by the respondents to have the highest domain levels.

The following statements were proposed as having significant implications for vocational pre-service and in-service teacher preparatory programs:

> The results of the study suggest that vocational teacher preparatory programs should place greater emphasis on the individualization of instruction, teaching at individual learning rates, writing of performance objectives, evaluation of instruction, and interpreting the goals and objectives of vocational education (Spaziani, 1972, p. 75).

## Summary

The review of the related literature provided evidence that several studies had been made to identify and determine professional and/or technical education competencies needed by teachers in industrial education, vocational education, or

education in general studies. Some of the studies concentrated on competencies required by doctoral graduates in industrial education, or other fields of education. Others emphasized competencies needed by secondary school teachers in industrial education, vocational education, or education in general studies while some stressed post-secondary requirements or a combination of both. Other studies had been conducted to determine whether a common core of competencies existed between two or more selected vocational areas.

The above studies indicated a need for determining professional and/or technical education competencies as a new approach to the development of a curriculum for preparing teachers in industrial education, vocational education, and education in general studies at secondary, post-secondary, and four-year college levels. Based upon the related literature reviewed, it seems appropriate to state that the investigation of professional education competencies of doctoral degree recipients in industrial education who teach at four-year colleges or universities is timely and incomplete at this time.

# CHAPTER III. METHODOLOGY

Five subheadings pertaining to methodology are used in this study: (1) Population of the study; (2) Development of the questionnaire; (3) Six areas of competencies; (4) Procedure of securing data; and (5) Methods of analysis and treatment of data. The five subheadings are delineated as follows:

## Population of the Study

The population of this study consisted of 353 doctoral degree recipients in industrial education who teach at four-year colleges or universities. The sample chosen to represent this population included those individuals who had received their doctoral degrees in industrial education during the period from September 1, 1968 through August 31, 1973. These individuals graduated from the 41 universities (Appendix A) identified in this study. The doctoral degree recipients were divided into the following three groups:

1. Instructors predominantly teaching undergraduate courses (N = 206)
2. Instructors predominantly teaching graduate courses (N = 27)
3. Department heads teaching graduate courses and/or undergraduate courses (N = 62)

## Development of the Questionnaire

The development of the questionnaire proceeded from the first draft through the third draft. The three drafts of the questionnaire are briefly described as follows:

1. The first draft of the research questionnaire was made by the investigator after a thorough review of the related literature.

2. The research questionnaire with an accompanying letter (Appendix B) was then sent to a jury made up of five recognized competency-based teacher educators (Appendix C) for the purpose of evaluating the professional education competencies. These individuals supplied the following information:

   a. Suggested revisions for certain competency items

   b. Suggested additions for new competency items

   c. Suggested deletions of certain competency items (Appendix D)

3. The second draft of the questionnaire was field-tested. Twenty randomly selected industrial education instructors who received their doctoral degrees either before August 31, 1968 or after September 1, 1973 were asked to respond to the "Instructions for Completion of the Questionnaire" and also requested to complete and return the questionnaire. Eighteen instructors returned the questionnaire for a return of 90 percent.

   The questionnaire included 84 competency items which were clustered under 6 subscales. The 6 subscales and the number of items clustered under each subscale are shown as follows:

   a. Planning for Instruction (items 1-10)

   b. Implementing Instruction (items 11-26)

   c. Evaluating Instruction (items 27-37)

d. Conducting Research (items 38-53)

e. Developing Curricula (items 54-64)

f. Miscellaneous (items 65-84)

The intercorrelation coefficients between the six subscales and the total scale were computed after field-testing to ascertain if they were all highly correlated. The reliability of the total scale as well as each subscale was tested by using the measurement technique of Cronbach Alpha reliability Coefficient (Cronbach, 1970, pp. 160-162). Based upon the results of the Pearson product-moment correlation coefficient technique (Ferguson, 1966, pp. 109-110), the intercorrelation coefficients between the six subscales and the total scale are shown in Table 1.

Table 1. Intercorrelation coefficients between the six subscales and the total scale

| Subscale | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| A. Planning for Instruction | | | | | | |
| B. Implementing Instruction | .78 | | | | | |
| C. Evaluating Instruction | .68 | .74 | | | | |
| D. Conducting Research | .65 | .53 | .72 | | | |
| E. Developing Curricula | .70 | .69 | .76 | .87 | | |
| F. Miscellaneous | .66 | .65 | .72 | .81 | .83 | |
| G. Total Scale | .81 | .80 | .87 | .90 | .93 | .91 |

We can see from Table 1 that the intercorrelation coefficients between the six subscales range from .53 to .87 and between each subscale and the total scale from .80 to .93. The relatively high correlation coefficients between each subscale and the total scale indicated that the competency items clustered under the 6 subscales were judged almost equally important by the respondents. It also indicated that the 6 subscales nearly measured the same trait.

The reliabilities of each of the 6 subscales and of the total scale were then tested by using the Cronbach Alpha reliability coefficient technique. The following table shows the results of the reliabilities tested.

Table 2. Reliabilities of the six subscales and the total scale of the questionnaire field-tested

| Subscale | Reliability |
|---|---|
| A. Planning for Instruction | .77 |
| B. Implementing Instruction | .89 |
| C. Evaluating Instruction | .87 |
| D. Conducting Research | .96 |
| E. Developing Curricula | .89 |
| F. Miscellaneous | .92 |
| G. Total Scale | .97 |

The above table shows the highest reliability of .96 (subscale D), the lowest reliability .77 (subscale A), and the reliability of the total scale as .97.

4. The third draft (final one) of the questionnaire was revised, based upon the suggestions of some of the respondents. Fourteen additional competency items and the definition of "Industrial Education" were added to the questionnaire which was field-tested. The 14 competency items listed on the final draft of the questionnaire (Appendix E) are #4, 6, 7, 8, 15, 85, 87, 88, 91, 92, 95, 96, 97 and 98. The definition of "Industrial Education" was added to the final draft of the questionnaire under the heading of "Purpose of this questionnaire." The final draft of the questionnaire includes 98 professional education competencies needed by doctoral degree recipients in industrial education who teach at four-year colleges or universities (Appendix F).

## Six Areas of Competencies

The six areas of competencies identified in the questionnaire of this study are: (1) Planning for instruction, (2) Implementing instruction, (3) Evaluating instruction, (4) Conducting research, (5) Developing curricula, and (6) Miscellaneous. Ninety-eight competencies identified in this study were clustered under the six areas of competencies. As Jack Miller (1971) Stated,

> Professional education competencies may be descriptively grouped or clustered for analysis. Teacher preparation courses, behavioral objectives, and instructional strategies may then be prepared based upon the common professional education competencies (p. 19).

It was considered that the six areas of competencies should be possessed by doctoral graduates in industrial education who teach at four-year colleges or universities. There were some persons, including teacher educators,

who stated that college faculty should be able to demonstrate the six areas of competencies in order to successfully carry out their professional duties and activities. Some persons' statements relative to each of the six areas of competencies are illustrated as follows:

Planning for instruction, implementing instruction, and evaluating instruction

Cotrell and others (1971) completed a study of model curricula for vocational and technical teacher education. In their study, planning for instruction, execution of instruction (implementing instruction), and evaluation of instruction were indicated as three major areas of competencies which should be possessed by vocational and technical teachers.

The performance requirements of teachers in the planning of instruction function include the teacher's responsibility for helping to plan and develop vocational and technical programs. Cotrell and others (1971) stated,

> Also included are the duties that revolve around selecting and developing courses, units and lessons, as well as the identification of instructional aids, materials and strategies (p. 17).

Competencies required of teachers in the execution of instruction (implementing instruction) consist of effective application of educational methods, techniques, and media.

Cotrell and others (1971) indicated, "Attention is also given to the needs of the learner and strategy appropriate for the particular teaching-learning situation" (p. 28).

Identification of the duties required of teachers in the evaluation of instruction embraces the selection and/or development of criteria and instruments for assessing, reporting, and interpreting student performance. Cotrell and others (1971) stated,

> Also included are the responsibilities pertinent to the evaluation of the effectiveness of the methods and media as well as the instructional performance of the teacher (p. 49).

A study by Erpelding (1972) at Kansas State University was to ascertain the professional education competency needs of post-secondary occupational education teachers in Kansas. In Erpelding's study, a questionnaire was developed to collect data needed for his study. There were 45 competencies identified and included in the questionnaire. The 45 competencies were clustered under the following three areas: (1) Planning for instruction (p. 118), (2) Implementing instruction (p. 119), and (3) Evaluating the instruction (p. 120).

In the last few years, growing attention has been directed to the importance and techniques of evaluating instruction. The Center for Vocational and Technical Education (1969) report included this statement:

> Increased attention must be given to the evaluation of instruction. Recent emphasis on "measurable objectives" and "goal-oriented instruction" must become a major research concern for industrial arts.... The need for articulated study in content selection and research into efficient and effective instructional modes both require meaningful evaluation of the quantity and quality of learning that result from curricula and instructional innovations.... The implications for increased efforts in terms of improving evaluation techniques as a positive factor in improving instructional efficiency and content revision cannot be overlooked (pp. 15-16).

Gage (1959) has identified three important reasons for evaluating instruction. Gage indicated,

> There is, first of all, the necessity for providing a basis on which a number of administrative decisions can be made, decisions about promotions in rank, increases in salary, and the granting of tenure (p. 26).

Clark (1961) has summarized Gage's view succinctly:

> Whenever we make a decision to retain a faculty member, or to let him go, we determine the nature of our college faculty for years to come. And when we decide whom to recognize and whom to reward, we modify the distribution of time and activities which is spent by members of our faculty (p. 43).

The second reason for trying to measure teaching effectiveness is that:

> The information generated provides a basis for self-improvement by the faculty. Just as students need feedback in order to correct errors, so also is feedback essential to faculty members (Gage, 1959, p. 26).

As Tyler (1959) has said,

> Hence, the development of a sound body of guiding concepts and principles in teaching is largely dependent upon means for evaluating teaching so that our principles have been tested rather than resting upon personal preference, or upon unsystematic impressions (p. 53).

The third reason given by Gage (1959) has to do with "the need for a criterion that can be employed in research on teaching and learning" (p. 27). Gustad (1967) held viewpoints similar to Gage's. Gustad stated,

> What we know is pitifully small compared with what we ought to know, and research efforts have been severely hampered by the lack of any even reasonably valid and reliable measures of outcomes. Once we have those, we will be in a position to move ahead with the research which will, some day, permit us to know enough to do our jobs better (p. 269).

Conducting research

The college teacher in industrial education must be competent enough in conducting research to acquire knowledge. "Research" should have a broad meaning in the formulation of doctoral programs for college teachers in industrial education without sacrificing the desirable features of genuine scholarship.

Denemark and Espinoza (1974) advocated the idea that a teacher educator should demonstrate the ability to link research and teaching. Denemark and Espinoza stated,

> It has become popular in recent years, and not without some cause, to view the research involvement of college teachers as an obstacle to their

> serious commitment to teaching rather than as a support of good teaching. Yet in many ways the teacher educator's involvement in research is essential.... It is important then that the process of educating a teacher educator produce both a student of the process of education - a contributor to the knowledge base regarding teaching - and a trainer of personnel. If the teacher educator is only the latter, the process of teacher education is likely to become didactic and prescriptive, lacking in the experimental, inquiry-oriented quality which is the hallmark of good teaching (pp. 195-196).

More than a decade ago the landmark report, New Horizons for the Teaching Profession, edited by Margaret Lindsey (1961), suggested that college teachers needed to be more than simply effective consumers of educational research. The report held that the college teacher:

> Should himself engage in research which is both thorough and relevant to the subsequent teaching responsibilities rather than the extreme specialization and traditional research in a narrow field. On the new horizon the teaching scholar will understand the relationship between teaching and research. Good teaching and sound experimentation should be mutually supportive, a matter of confluence rather than of conflict. The graduate thesis and other research activities should be designed to bring the student's work as a productive research scholar and as a productive teacher of students into harmonious relationship.... Experience with the kinds of research important to the scholar whose central role is teaching must be a part of the graduate program (pp. 94-95).

Gage (1967) presented strong support for Lindsey's viewpoints. Gage believed,

> The involvement of faculty in a research effort in depth will, I am convinced, serve to improve teaching. As faculty become involved in research

> about teaching, they grow more conscious of the student as a learner. They begin to make finer discriminations among students, to be more sensitive to student needs and more flexible in their approach to the teaching relationship (p. 250).

Wiersma and Dickson (1973) expressed the viewpoints that the teacher education faculty member should assume the responsibility of conducting research, and that all faculty members should be knowledgeable about basic research procedures and principles. Wiersma and Dickson stated,

> Just as the function of teaching will take on different characteristics, the function of research will now take on a new and more important character. As the opportunity for research, especially development research, increases, so will the need for such research. The opportunity and need for research, however, will add to the responsibilities of the teacher education faculty member, primarily in the area of empirical data production. Teacher education faculty will not be exclusively a group of research specialists. However, all members of the faculty will be required to be much more knowledgeable about elementary research procedures and principles than has been the case. In addition, their ability to apply these principles will be subject to continuous evaluation. Research procedures must be regarded as useful tools for the professor's use, rather than mysterious skills possessed by a small select group of the faculty (pp. 117-118).

## Developing curricula

One of the major areas of competencies needed by industrial education instructors at the four-year college level is developing curricula. McMahon (1972) believed that one of the most important determinants in curriculum development is the availability of qualified instructors. McMahon

stated,

> As determinants in curriculum construction each is vital; yet they all rest, ultimately, upon the base of the availability of qualified instructors. The finest building, the most up-to-date equipment, and the most expert choice of students are meaningless without teachers who have the background of experience which brings reality to the curriculum.... The emphasis here must rest on the contention that the availability of competent teachers is one of the most important determinants of curriculum either in the establishment of new program or in the continuance of old (pp. 62-63).

Hass, Wiles, and Bondi (1970) held the viewpoint that it was the role of the teacher educators to construct a recommended plan of action for curriculum change. Hass, Wiles, and Bondi stated,

> It is the job of the professional educators to provide structure for planning with others, to inform, to offer recommendations, to bring together contributions from all sources, and to work out a recommended plan of action for curriculum change. In the analysis of the curriculum which is planned, the professional educator must be certain that it takes account of the nature of the learner and of the society of which he is a part. This part of the professional educator's role is not new but it will have increasing importance as he works and plans with others who are not so likely to give adequate attention to these bases for curriculum decisions (p. 422).

Industrial education instructors should work together and contribute their competencies to the development of curriculum as expressed by Taba (1962). Taba indicated succinctly,

> Curriculum work requires integration of many competencies not usually found in one person.

> Therefore, planned teamwork, in which each individual concentrates on his own task but also in which a range of needed competencies is combined in such a manner that they can support and supplement each other, is one essential requirement for productivity (p. 472).

Nicholls (1972) deemed,

> If teachers are unwilling to cooperate, to share ideas and to plan and work together it will be difficult to develop a curriculum which is cohesive and consistent (p. 95).

A functional course of study will make a contribution to the curriculum for which it is designed, weaving into the fabric of the curriculum an understanding of the many interdisciplinary facets of the subject matter involved. As Giachino and Gallington (1967) suggested,

> All teachers charged with the responsibility of course construction should investigate the total educational program, its philosophies and goals. The particular curriculum into which a course fits is of great importance (p. 59).

Miscellaneous

In addition to teaching, conducting research, and developing curricula competencies, an industrial education instructor at a four-year college level should possess some additional competencies. These include participation in the academic community, intellectual breadth, relations with students; as well as participation in establishing institutional policies and rules, involvement in professional societies, and consultations.

The first three competencies were presented by Wilson,

Dienst, and Watson in Spring 1973. They conducted a study at the University of California, Berkeley, to explore, in part, some of the characteristics which faculty members ascribe to colleagues whom they regard as effective teachers. Three of the five major areas of competencies produced by a principal-components analysis of the descriptions of effective teachers were participation in the academic community, intellectual breadth, and relations with students. The three areas of competencies were defined as follows:

1. Participation in the Academic Community: Attends and participates in campus lectures, social functions, and student-oriented activities. Maintains a congenial relationship with colleagues.

2. Intellectual Breadth: Has broad knowledge both within and beyond his field. Is sought out by students and colleagues for information and academic advice.

3. Relations with Students: Maintains an informal and congenial relationship with students beyond the classroom. Is consistently available to students for consultation about personal and academic concerns (Wilson et al., 1973, p. 33).

Byse (1967) indicated that college faculty should pursue the role of participation in establishing institutional policies and rules. Byse stated,

> ...Administration and faculty must share responsibility for establishing institutional policies and rules. Policies or rules unilaterally imposed by governing boards or administrators but developed without faculty participation will often be defective because their effect on the faculty's discharge of their teaching and research functions

> has not been ascertained.... If, however, faculty members share in the responsibility for working out solutions, if they participate meaningfully in the decisional process, there is every likelihood that they will accept the solutions and that their feelings of loyalty to the institution will be intensified (p. 42).

A college teacher's involvement in the activities of professional societies and consultations has been pointed out by Lee (1967). Lee stated,

> Today, the conflicts among academic loyalties appear to be more numerous and more severe than ever before. A college teacher's interest in bettering teaching and learning can now be diverted by other demands. A centrifugal force pulls faculty members to heavy involvements with their professional societies, consultations, and publications (p. 2).

In conclusion, the six areas of competencies -- planning for instruction, implementing instruction, evaluating instruction, conducting research, developing curricula, and miscellaneous -- were indicated by a number of teacher educators as important and necessary for college teachers to possess. In the writer's opinion, planning for instruction, implementing instruction, and evaluating instruction are three basic roles that an industrial education instructor should pursue. In addition, he should be able to conduct research to contribute new knowledge and/or to explore new concepts relative to certain aspects of industrial education. Also, he should demonstrate the ability to develop curricula to accommodate student's needs and goals and to meet the de-

mands of the society. Furthermore, he should possess miscellaneous competencies to successfully perform his professional duties and activities. Therefore, doctoral graduates in industrial education who teach at four-year colleges or universities should possess the six areas of competencies to be successful in their teaching endeavors and related activities, and to advance in their teaching positions. The six areas of competencies seemed appropriate and inclusive for purposes of this study.

## Procedure of Securing Data

Four main steps were followed to secure data for this study. Each step is described as follows:

1. The name of industrial education departments which had offered doctoral programs between 1968 and 1973 was secured from the Industrial Teacher Education Directory.

2. A letter (Appendix G) was sent to each of the department heads requesting the names and addresses of the doctoral degree recipients graduated from each department during the period September 1, 1967 to August 31, 1974.

3. Two methods were used to identify and classify the recipients of doctoral degrees provided by the department heads. One method was to identify the recipients in the Industrial Teacher Education Directory. The other method was through the individuals identification of their major responsibilities.

   The instructors were classified as (1) predominantly teaching undergraduate courses, or (2) predominantly teaching graduate courses, and (3) department heads teaching graduate courses and/or undergraduate courses.

4. A letter (Appendix H) along with the questionnaire was sent to each of the industrial education instructors identified in the sample of this study to collect data needed for this study. The number of instructors was 353. Each individual was requested to complete the questionnaire sent to him and return it to the investigator. A first follow-up letter (Appendix I) was mailed to each of the instructors who had not returned their questionnaires to the investigator. Thereafter, a second follow-up letter (Appendix J) along with the questionnaire, and a third follow-up letter (Appendix K) was subsequently mailed to nonrespondents. Of the 353 questionnaires mailed, 320 questionnaires (90.65%) were returned. Of the 320 questionnaires returned, 4 questionnaires were incomplete; another 3 questionnaires indicated that doctorate completed either before September 1, 1968 or after August 31, 1973; and 18 questionnaires stated that the respondents taught both undergraduate course(s) and graduate course(s). Thus, a total of 295 (83.57%) of the returns were considered usable for this study.

## Methods of Analysis and Treatment of Data

After the questionnaires were returned by the respondents, data on the questionnaires were keypunched on IBM cards and verified. The facilities of the Computation Center at Iowa State University were used to process and analyze portions of the data.

The questionnaire was divided into 6 subscales according to identified areas of competencies. By using the statistical technique of factor analysis to detect common traits that underlie 98 competency items included in the questionnaire, 22 factors were identified through a factor pattern matrix. The original scale, including 6 subscales,

was then amplified and converted to include 22 factors. In order to determine the appropriateness of the questionnaire for further statistical treatments, Spearman Brown average interitem reliability coefficients were computed on responses over all items and 21 of the 22 factors. Factor 22 was omitted since this factor includes only one competency item.

The first problem of this study was solved and the first objective of this study achieved by using the following criterion: If 66% or higher of either the total respondents or the respondents of each of the three groups of instructors rated a certain competency item equal to 3 or larger than 3 (using a Likert scale of 1-5), the item was considered as an important professional education competency. The proficiency scale of one to five was converted to an importance scale. The important professional education competencies were then classified in three levels in terms of the respondents' judgment of the competencies. Each competency item rated between 3 and 3.66 was classified as an important professional education competency; between 3.67 and 4.33, very important professional education competency; and between 4.34 and 5, most important professional education competency.

The hypothesis formulated in this study was tested by using a One-way Classification Analysis of Variance treatment (Popham, 1967, pp. 173-176). The use of the analysis of variance was to test for mean differences among the three groups of instructors in this study. If there was a significant

difference of the mean among the three groups of instructors when testing each of the 22 factors identified in this study at the .05 level of confidence, the Scheffé Method of Multiple Comparisons (Ferguson, 1966, pp. 296-297) was employed to determine between which particular groups the difference occurred. Each competency item included in a factor to which the Scheffé method was applied was further tested to determine if there was a significant difference of the mean between any two of the three groups of instructors.

# CHAPTER IV. FINDINGS

The findings of this study are discussed in three general areas: (1) Reliability of the questionnaire factors; (2) Important professional education competencies; and (3) Testing the hypothesis. The three areas are delineated below.

## Reliability of the Questionnaire Factors

By using the statistical technique of the Spearman Brown average interitem reliability, the reliability of each of the 22 factors, except factor 22, identified in this study, and the total factors is computed. The completed values of reliability are shown in Table 3.

The data in Table 3 shows the highest reliability of .89 (factor 4), the lowest reliability .69 (factor 19), and the reliability of the total factors as .96.

## Important Professional Education Competencies

The first problem of this study was to identify the important professional education competencies of doctoral degree recipients in industrial education who teach at four year colleges or universities. In connection with this problem, the first objective of this study was to identify which professional education competencies needed by doctoral

Table 3. Reliabilities of the 22 factors, except factor 22, and the total factors amplified and converted from the 6 subscales of the questionnaire

| Factor | Reliability |
|---|---|
| 1 | .81 |
| 2 | .86 |
| 3 | .88 |
| 4 | .89 |
| 5 | .84 |
| 6 | .84 |
| 7 | .84 |
| 8 | .81 |
| 9 | .79 |
| 10 | .85 |
| 11 | .74 |
| 12 | .72 |
| 13 | .75 |
| 14 | .78 |
| 15 | .78 |
| 16 | .71 |
| 17 | .75 |
| 18 | .71 |
| 19 | .69 |
| 20 | .78 |
| 21 | .72 |
| 22 | - |
| Total Factors | .96 |

degree recipients in industrial education were rated as important by the judgments of the total respondents and the respondents of each of the three groups of instructors.

In order to solve the problem and to achieve this objective, a list of important professional education competencies was established by using the judgments of the total respondents and the respondents of each of the three groups of instructors. Each of the four lists of important professional education competencies which were established by using the judgments of the total respondents and the respondents of each of the three groups of instructors will be illustrated respectively.

1. A list of important professional education competencies was established by using the judgments of the total respondents

According to the criterion set up for solving the first problem of this study and for achieving the first objective of this study, a list of 98 important professional education competencies was established by using the judgments of the total respondents. There were 16 competencies rated most important; 75 competencies rated very important; and 7 competencies rated important. The item number, rank order of importance, cumulative point average (C.P.A), and percentage of each of the 98 important professional education

competencies are listed in Table 4.

2. A list of important professional education competencies was established by using the judgments of the instructors teaching predominantly undergraduate courses

According to the criterion established earlier for solving the first problem of this study and for achieving the first objective of this study, a list of 96 important professional education competencies was established by using the judgments of the instructors teaching predominantly undergraduate courses. There were 15 competencies rated most important; 73 competencies rated very important; and 8 competencies rated important. The data in Table 5 shows the item number, rank order of importance, cumulative point average (C.P.A.), and percentage of each of the 96 important professional education competencies. The two competency items (58 and 81) which were not supported by 66% or higher or instructors teaching predominantly undergraduate courses are also listed at the end of Table 5.

Table 4. Relative importance which the total respondents (N = 295) placed on a list of professional education competencies

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "most important" (1-16) | | | | |
| 85 | Listen to colleagues and/or students | 1 | 4.592 | 98 |
| 27 | Stimulate and maintain students' interest throughout the instructional process | 2 | 4.550 | 100 |
| 10 | Keep course(s) of study and instructional materials up to date | 3 | 4.495 | 99 |
| 4 | Demonstrate a high level of knowledge of subject matter | 4 | 4.465 | 99 |
| 84 | Communicate ideas or points of view to other instructors or administrators | 5 | 4.459 | 98 |
| 14 | Establish evaluative criteria for a course | 6 | 4.455 | 99 |
| 55 | Write in a clear, concise manner acceptable to graduate-level standards | 7 | 4.453 | 95 |
| 83 | Work effectively with department heads and/or other administrative personnel | 8 | 4.448 | 96 |
| 28 | Supervise or manage student activities in the laboratory/classroom | 9 | 4.424 | 99 |

[a]Cumulative Point Average: The average was calculated by multiplying the ratings (3 through 5) by its corresponding percentage and then dividing the sum of this product by the sum of the rating percentages. The competencies were grouped according to the following criteria: C.P.A. = 5 to 4.34, most important; C.P.A. = 4.33 to 3.67, very important; and C.P.A. = 3.66 to 3, important.

[b]Denotes the percentage of the 295 respondents who judged the competency items equal to 3 or larger than 3.

Table 4 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| | Competencies rated "most important" (1-16) (Continued) | | | |
| 88 | Demonstrate practice consistent with stated beliefs | 10 | 4.423 | 97 |
| 2 | Recognize student needs and/or goals | 11 | 4.420 | 100 |
| 32 | Understand basic principles of educational testing and measurement | 12.5 | 4.384 | 99 |
| 67 | Analyze and organize subject matter into instructional units | 12.5 | 4.384 | 99 |
| 15 | Specify instructional objectives based upon the needs of students | 14 | 4.378 | 98 |
| 16 | Demonstrate a humanistic approach to instruction | 15 | 4.371 | 97 |
| 90 | Understand state certification requirements for industrial education teachers | 16 | 4.344 | 96 |
| | Competenies rated "very important" (17-91) | | | |
| 71 | Understand current trends in industrial education | 17 | 4.323 | 99 |
| 68 | Phase out nonfunctional units | 18 | 4.305 | 95 |
| 19 | Use texts, reference material, and special teaching aids | 19 | 4.296 | 98 |
| 7 | Make the distinction between the terms "industrial education", industrial arts", and "vocational education" in meaning, scope, and activities | 20 | 4.261 | 92 |

Table 4 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "very important" (17-91) (Continued) | | | | |
| 65 | Organize and develop a curriculum around useful and meaningful units of experience that relate the instructional program to industrial practices | 21.5 | 4.258 | 97 |
| 87 | Demonstrate organizational skills | 21.5 | 4.258 | 97 |
| 1 | Formulate and defend a consistent philosophy of industrial education | 23 | 4.247 | 97 |
| 5 | Demonstrate a high level of technical performance in certain area(s) of specialization | 24 | 4.242 | 95 |
| 76 | Function as a member of a committee | 25 | 4.237 | 93 |
| 72 | Demonstrate knowledge of current trends and concepts affecting industrial education | 26 | 4.214 | 98 |
| 35 | Assess student cognitive performance | 27 | 4.212 | 99 |
| 75 | Keep abreast of professional developments | 28 | 4.204 | 98 |
| 41 | Interpret and use students' evaluation of instruction | 29.5 | 4.189 | 95 |
| 66 | Construct an instructional program consistent with performance-based objectives | 29.5 | 4.189 | 95 |
| 25 | Relate technological advances to laboratory and classroom instruction | 31.5 | 4.186 | 97 |
| 17 | Diagnose and prescribe instruction based upon individual needs and abilities | 31.5 | 4.186 | 97 |

Table 4 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "very important" (17-91) (Continued) | | | | |
| 59 | Develop new curricula and programs based upon suggestions provided by advisory committees and/or practicing teachers | 33 | 4.172 | 93 |
| 54 | Demonstrate competence to assist graduate students in writing thesis proposals and conducting research | 34.5 | 4.155 | 84 |
| 29 | Perform guidance activities on an informal and/or formal basis | 34.5 | 4.155 | 97 |
| 70 | Understand the role of industrial education as it relates to career education | 36 | 4.146 | 96 |
| 92 | Communicate with industry | 37 | 4.135 | 96 |
| 3 | Plan instruction to accommodate diverse student groups | 38 | 4.134 | 97 |
| 63 | Understand social, economic, and technological changes and their implications for industrial education curriculum development | 39 | 4.133 | 98 |
| 26 | Relate current events associated with the area of specialization to classroom instruction | 40 | 4.122 | 98 |
| 36 | Assess student psychomotor performance | 42 | 4.117 | 94 |
| 74 | Locate the sources and variety of information needed to meet professional responsibilities | 42 | 4.117 | 94 |
| 77 | Demonstrate awareness of the purpose and programs of professional associations by membership in those organizations | 42 | 4.117 | 94 |
| 95 | Follow administrative practices, and principles | 44 | 4.115 | 96 |

Table 4 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| 8 | Understand the meaning of the word "technology" | 45 | 4.108 | 93 |
| 9 | Select components of the instructional program from the multitude of existing curriculum materials | 46 | 4.103 | 97 |
| 38 | Construct and use achievement tests | 47 | 4.099 | 91 |
| 34 | Construct and use performance-based criterion-referenced evaluation instruments | 48 | 4.098 | 92 |
| 31 | Conduct in-service short-term workshops for teachers and industrial personnel | 49 | 4.091 | 88 |
| 64 | Combine jobs, operations, and related information into a course of study | 50 | 4.088 | 91 |
| 97 | Plan physical facilities for industrial arts, and vocational education | 51 | 4.082 | 85 |
| 82 | Lead a conference and/or a meeting | 52 | 4.076 | 92 |
| 89 | Understand federal and state laws pertaining to industrial education | 53.5 | 4.074 | 94 |
| 98 | Evaluate instructional staff | 53.5 | 4.074 | 81 |
| 39 | Assess the validity of teacher-made tests | 55 | 4.065 | 92 |
| 96 | Prepare budgets for operating a Department of Industrial Education | 56 | 4.063 | 79 |
| 86 | Communicate with a public audience | 57.5 | 4.054 | 92 |
| 40 | Assess the reliability of teacher-made tests | 57.5 | 4.054 | 92 |

Table 4 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| | Competencies rated "very important" (17-91) (Continued) | | | |
| 73 | Assist in the development of new professional knowledge and information | 59 | 4.053 | 95 |
| 30 | Supervise and direct students' practice teaching | 60 | 4.041 | 74 |
| 20 | Develop audio-visual material for instructional purposes | 61 | 4.031 | 96 |
| 37 | Assess student affective performance | 62 | 4.022 | 91 |
| 94 | Establish and support internships in industry and business | 63 | 4.012 | 83 |
| 11 | Use the information contained in professional journals and literature in industrial education | 64 | 4.010 | 96 |
| 78 | Understand the responsibilities of a member of professional organizations | 65 | 4.000 | 95 |
| 42 | Use the findings of follow-up studies for determining effectiveness of instruction | 66 | 3.989 | 89 |
| 61 | Make use of program evaluation to develop curricula | 67 | 3.968 | 95 |
| 51 | Conduct and encourage laboratory/classroom research | 68 | 3.943 | 88 |
| 62 | Develop interdisciplinary and multidisciplinary curricula | 69 | 3.921 | 89 |
| 46 | Make effective use of research and curriculum retrieval systems such as ERIC | 70 | 3.918 | 85 |
| 56 | Write abstracts for research reports | 71 | 3.895 | 76 |
| 47 | Read and evaluate literature relative to research | 72 | 3.890 | 91 |

Table 4 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "very important" (17-91) (Continued) | | | | |
| 80 | Demonstrate leadership in professional organizations | 73 | 3.886 | 88 |
| 52 | Interpret and utilize research findings and implications for existing industrial education programs | 74 | 3.880 | 92 |
| 93 | Establish and maintain advisory committees | 75 | 3.873 | 79 |
| 12 | Use research findings regarding effectiveness of teaching methodology | 76 | 3.868 | 91 |
| 50 | Write proposals for research and/or pilot projects | 77 | 3.864 | 81 |
| 43 | Understand statistical techniques used for conducting research | 78 | 3.860 | 86 |
| 57 | Publish papers and/or research reports | 79 | 3,848 | 79 |
| 53 | Interpret the findings of studies which have a bearing on the educational, psychological, and social problems of industrial education students | 80 | 3.837 | 86 |
| 49 | Identify research problems for study | 81 | 3.831 | 83 |
| 48 | Keep abreast of current research projects | 82.5 | 3.817 | 93 |
| 44 | Conduct research using a variety of appropriate research skills and controls | 82.5 | 3.817 | 82 |
| 79 | Prepare and submit reports for national/state professional conferences | 84 | 3.785 | 79 |
| 45 | Utilize the computer to analyze and summarize data collected | 85 | 3.760 | 75 |

Table 4 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "very important" (17-91) (Continued) | | | | |
| 18 | Use methods to meet special needs of handicapped students | 86 | 3.753 | 77 |
| 91 | Relate to community organizations | 87 | 3.744 | 82 |
| 60 | Make use of manpower data to develop curricula | 88 | 3.723 | 83 |
| 69 | Design and implement an adult education course or program | 89 | 3.712 | 73 |
| 81 | Plan for and organize a youth group | 90 | 3.672 | 67 |
| 58 | Develop a program evaluation and review technique (PERT) network | 91 | 3.667 | 69 |
| Competencies rated "important" (92-98) | | | | |
| 21 | Use the micro-teaching method | 92 | 3.616 | 73 |
| 13 | Understand the history of industrial education | 93 | 2.610 | 77 |
| 33 | Select and use appropriate standardized tests to measure achievement | 94 | 3.569 | 72 |
| 23 | Develop and use programmed instruction | 95 | 3.559 | 68 |
| 22 | Use audio-tutorial instruction | 96 | 3.541 | 74 |
| 6 | Understand all components of vocational education including agricultural education, business and office education, distributive education health occupations, home economics, and trade and industrial education | 97 | 3.535 | 71 |
| 24 | Use televised instruction in the laboratory/classroom | 98 | 3.486 | 70 |

Table 5. Relative importance which the instructors teaching predominantly undergraduate courses (N = 206) placed on a list of professional education competencies

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "most important" (1-15) | | | | |
| 85 | Listen to colleagues and/or students | 1 | 4.577 | 97 |
| 27 | Stimulate and maintain students' interest throughout the instructional process | 2 | 4.540 | 100 |
| 10 | Keep course(s) of study and instructional materials up to date | 3 | 4.495 | 99 |
| 4 | Demonstrate a high level of knowledge of subject matter | 4 | 4.470 | 100 |
| 28 | Supervise or manage student activities in the laboratory/classroom | 5 | 4.469 | 98 |
| 14 | Establish evaluative criteria for a course | 6 | 4.450 | 100 |
| 55 | Write in a clear, concise manner acceptable to graduate-level standards | 7 | 4.430 | 93 |
| 84 | Communicate ideas or points of view to other instructors or administrators | 8 | 4.417 | 96 |
| 88 | Demonstrate practice consistent with stated beliefs | 9 | 4.396 | 96 |

[a]Cumulative Point Average: The average was calculated by multiplying the ratings (3 through 5) by its corresponding percentage and then dividing the sum of this product by the sum of the rating percentages. The competencies were grouped according to the following criteria: C.P.A. = 5 to 4.34, most important; C.P.A. = 4.33 to 3.67, very important; and C.P.A. = 3.66 to 3, important.

[b]Denotes the percentage of the 206 respondents who judged the competency items equal to 3 or larger than 3.

Table 5 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "most important" (1-15) (Continued) | | | | |
| 2 | Recognize student needs and/or goals | 10 | 4.390 | 100 |
| 32 | Understand basic principles of educational testing and measurement | 11 | 4.378 | 98 |
| 83 | Work effectively with department heads and/or other administrative personnel | 12 | 4.375 | 96 |
| 67 | Analyze and organize subject matter into instructional units | 13 | 4.374 | 99 |
| 16 | Demonstrate a humanistic approach to instruction | 14 | 4.365 | 96 |
| 15 | Specify instructional objectives based upon the needs of students | 15 | 4.347 | 98 |
| Competencies rated "very important" (16-88) | | | | |
| 5 | Demonstrate a high level of technical performance in certain area(s) of specialization | 16 | 4.333 | 96 |
| 19 | Use texts, reference material, and special teaching aids | 17 | 4.323 | 99 |
| 71 | Understand current trends in industrial education | 18 | 4.296 | 98 |
| 68 | Phase out nonfunctional units | 19 | 4.295 | 95 |
| 65 | Organize and develop a curriculum around useful and meaningful units of experience that relate the instructional program to industrial practices | 20 | 4.235 | 98 |
| 90 | Understand state certification requirements for industrial education teachers | 21 | 4.213 | 94 |

Table 5 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| | Competencies rated "very important" (16-88) (Continued) | | | |
| 7 | Make the distinction between the terms "industrial education", industrial arts", and "vocational education" in meaning, scope, and activities | 22 | 4.209 | 91 |
| 1 | Formulate and defend a consistent philosophy of industrial education | 23 | 4.206 | 97 |
| 25 | Relate technological advances to laboratory and classroom instruction | 24 | 4.184 | 98 |
| 35 | Assess student cognitive performance | 25 | 4.172 | 99 |
| 41 | Interpret and use students' evaluation of instruction | 26.5 | 4.167 | 96 |
| 87 | Demonstrate organizational skills | 26.5 | 4.167 | 96 |
| 29 | Perform guidance activities on an informal and/or formal basis | 28.5 | 4.165 | 97 |
| 72 | Demonstrate knowledge of current trends and concepts affecting industrial education | 28.5 | 4.165 | 97 |
| 76 | Function as a member of a committee | 30.5 | 4.161 | 93 |
| 66 | Construct an instructional program consistent with performance-based objectives | 30.5 | 4.161 | 93 |
| 17 | Diagnose and prescribe instruction based upon individual needs and abilities | 32 | 4.155 | 97 |
| 75 | Keep abreast of professional developments | 33 | 4.144 | 97 |

Table 5 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "very important" (16-88) (Continued) | | | | |
| 38 | Construct and use achievement tests | 34 | 4.135 | 89 |
| 3 | Plan instruction to accommodate diverse student groups | 35 | 4.134 | 97 |
| 26 | Relate current events associated with the area of specialization to classroom instruction | 36 | 4.121 | 99 |
| 70 | Understand the role of industrial education as it relates to career education | 37 | 4.116 | 95 |
| 9 | Select components of the instructional program from the multitude of existing curriculum materials | 38 | 4.115 | 96 |
| 59 | Develop new curricula and programs based upon suggestions provided by advisory committees and/or practicing teachers | 39 | 4.109 | 92 |
| 63 | Understand social, economic, and technological changes and their implications for industrial education curriculum development | 40 | 4.103 | 97 |
| 92 | Communicate with industry | 41 | 4.096 | 94 |
| 8 | Understand the meaning of the word "technology" | 42.5 | 4.086 | 93 |
| 36 | Assess student psychomotor performance | 42.5 | 4.086 | 93 |
| 20 | Develop audio-visual material for instructional purposes | 44 | 4.083 | 96 |
| 54 | Demonstrate competence to assist graduate students in writing thesis proposals and conducting research | 45 | 4.074 | 81 |

Table 5 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "very important" (16-88) (Continued) | | | | |
| 64 | Combine jobs, operations, and related information into a course of study | 46 | 4.066 | 91 |
| 34 | Construct and use performance-based criterion-referenced evaluation instruments | 47 | 4.055 | 91 |
| 74 | Locate the sources and variety of information needed to meet professional responsibilities | 48 | 4.053 | 94 |
| 31 | Conduct in-service short-term workshops for teachers and industrial personnel | 49 | 4.047 | 85 |
| 39 | Assess the validity of teacher-made tests | 50 | 4.044 | 91 |
| 77 | Demonstrate awareness of the purpose and programs of professional associations by membership in those organizations | 51 | 4.043 | 92 |
| 40 | Assess the reliability of teacher-made tests | 52 | 4.022 | 92 |
| 82 | Lead a conference and/or a meeting | 53 | 3.989 | 89 |
| 97 | Plan physical facilities for industrial arts, and vocational education | 54 | 3.988 | 83 |
| 73 | Assist in the development of new professional knowledge and information | 56 | 3.978 | 93 |
| 78 | Understand the responsibilities of a member of professional organizations | 56 | 3.978 | 93 |
| 37 | Assess student affective performance | 56 | 3.978 | 89 |

Table 5 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "very important" (16-88) (Continued) | | | | |
| 86 | Communicate with a public audience | 58.5 | 3.977 | 88 |
| 42 | Use the findings of follow-up studies for determining effectiveness of instruction | 58.5 | 3.977 | 86 |
| 30 | Supervise and direct students' practice teaching | 60 | 3.971 | 69 |
| 11 | Use the information contained in professional journals and literature in industrial education | 61 | 3.969 | 97 |
| 95 | Follow administrative practices, and principles | 62.5 | 3.968 | 95 |
| 89 | Understand federal and state laws pertaining to industrial education | 62.5 | 3.968 | 93 |
| 94 | Establish and support internships in industry and business | 64 | 3.925 | 80 |
| 61 | Make use of program evaluation to develop curricula | 65 | 3.917 | 96 |
| 51 | Conduct and encourage laboratory/classroom research | 66 | 3.882 | 85 |
| 98 | Evaluate instructional staff | 67 | 3.878 | 74 |
| 62 | Develop interdisciplinary and multidisciplinary curricula | 68 | 3.874 | 87 |
| 96 | Prepare budgets for operating a Department of Industrial Education | 69 | 3.863 | 73 |
| 46 | Make effective use of research and curriculum retrieval systems such as ERIC | 70 | 3.855 | 83 |

Table 5 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "very important" (16-88) (Continued) | | | | |
| 12 | Use research findings regarding effectiveness of teaching methodology | 71 | 3.843 | 89 |
| 43 | Understand statistical techniques used for conducting research | 72 | 3.833 | 84 |
| 56 | Write abstracts for research reports | 73 | 3.831 | 71 |
| 47 | Read and evaluate literature releative to research | 74 | 3.820 | 89 |
| 52 | Interpret and utilize research findings and implications for existing industrial education programs | 75 | 3.811 | 90 |
| 44 | Conduct research using a variety of appropriate research skills and controls | 76 | 3.797 | 79 |
| 50 | Write proposals for research and/or pilot projects | 77 | 3.792 | 77 |
| 80 | Demonstrate leadership in professional organizations | 78 | 3.783 | 83 |
| 93 | Establish and maintain advisory committees | 79.5 | 3.773 | 75 |
| 57 | Publish papers and/or research reports | 79.5 | 3.773 | 75 |
| 53 | Interpret the findings of studies which have a bearing on the educational, psychological, and social problems of industrial education students | 81 | 3.759 | 83 |
| 45 | Utilize the computer to analyze and summarize data collected | 83 | 3.753 | 73 |

Table 5 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "very important" (16-88) (Continued) | | | | |
| 91 | Relate to community organizations | 83 | 3.753 | 77 |
| 49 | Identify research problems for study | 83 | 3.753 | 81 |
| 48 | Keep abreast of current research projects | 85 | 3.736 | 91 |
| 18 | Use methods to meet special needs of handicapped students | 86 | 3.726 | 73 |
| 60 | Make use of manpower data to develop curricula | 87 | 3.679 | 78 |
| 69 | Design and implement an adult education course or program | 88 | 3.667 | 69 |
| Competencies rated "important" (89-96) | | | | |
| 79 | Prepare and submit reports for national/state professional conferences | 89 | 3.658 | 73 |
| 21 | Use the micro-teaching method | 90 | 3.592 | 71 |
| 22 | Use audio-tutorial instruction | 91 | 3.581 | 74 |
| 23 | Develop and use programmed instruction | 92 | 3.537 | 67 |
| 13 | Understand the history of industrial education | 93 | 3.533 | 75 |
| 33 | Select and use appropriate standardized tests to measure achievement | 94 | 3.522 | 67 |
| 24 | Use televised instruction in the laboratory/classroom | 95 | 3.485 | 68 |

Table 5 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "important" (89-96) (Continued) | | | | |
| 6 | Understand all components of vocational education including agricultural education, business and office education, distributive education, health occupations, home economics, and trade and industrial education | 96 | 3.441 | 68 |
| Competencies rated "less important" | | | | |
| 58 | Develop a program evaluation and review technique (PERT) network | | 3.523 | 65 |
| 81 | Plan for and organize a youth group | | 3.548 | 62 |

3. A list of important professional education competencies was established by using the judgments of the instructors teaching predominantly graduate courses

According to the established criterion for solving the first problem of this study and for achieving the first objective of this study, a list of 98 important professional education competencies was established by using the judgments of the instructors teaching predominantly graduate courses. There were 34 competencies rated most important; 59 competencies rated very important; and 5 competencies rated important. The item number, rank order of importance, cumulative point average (C.P.A.), and percentage of each of the 98 important professional education competencies were listed in Table 6.

4. A list of important professional education competencies was established by using the judgments of the department heads teaching graduate courses and/or undergraduate courses

According to the predetermined criterion for solving the first problem of this study and for achieving the first objective of this study, a list of 98 important professional education competencies was established by using the judgments of the department heads teaching graduate courses and/or undergraduate courses. There were 22 competencies rated

Table 6. Relative importance which the instructors teaching predominantly graduate courses (N = 27) placed on a list of professional education competencies

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "most important" (1-34) | | | | |
| 27 | Stimulate and maintain students' interest throughout the instructional process | 1 | 4.660 | 100 |
| 55 | Write in a clear, concise manner acceptable to graduate-level standards | 2 | 4.630 | 100 |
| 15 | Specify instructional objectives based upon the needs of students | 3 | 4.602 | 93 |
| 2 | Recognize student needs and/or goals | 5 | 4.560 | 100 |
| 90 | Understand state certification requirements for industrial education teachers | 5 | 4.560 | 100 |
| 85 | Listen to colleagues and/or students | 5 | 4.560 | 100 |
| 75 | Keep abreast of professional developments | 9.5 | 4.520 | 100 |
| 71 | Understand current trends in industrial education | 9.5 | 4.520 | 100 |
| 32 | Understand basic principles of educational testing and measurement | 9.5 | 4.520 | 100 |

[a]Cumulative Point Average: The average was calculated by multiplying the ratings (3 through 5) by its corresponding percentage and then dividing the sum of this product by the sum of the rating percentages. The competencies were grouped according to the following criteria: C.P.A. = 5 to 4.34, most important; C.P.A. = 4.33 to 3.67, very important, and C.P.A. = 3.66 to 3, important.

[b]Denotes the percentage of the 27 respondents who judged the competency items equal to 3 or larger than 3.

Table 6 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "most important" (1-34) (Continued) | | | | |
| 14 | Establish evaluative criteria for a course | 9.5 | 4.520 | 100 |
| 4 | Demonstrate a high level of knowledge of subject matter | 9.5 | 4.520 | 100 |
| 84 | Communicate ideas or points of view to other instructors or administrators | 9.5 | 4.520 | 100 |
| 54 | Demonstrate competence to assist graduate students in writing thesis proposals and conducting research | 13.5 | 4.510 | 96 |
| 83 | Work effectively with department heads and/or other administrative personnel | 13.5 | 4.510 | 96 |
| 10 | Keep course(s) of study and instructional materials up to date | 15 | 4.490 | 100 |
| 13 | Understand the history of industrial education | 16 | 3.482 | 85 |
| 31 | Conduct in-service short-term workshops for teachers and industrial personnel | 18 | 4.480 | 100 |
| 72 | Demonstrate knowledge of current trends and concepts affecting industrial education | 18 | 4.480 | 100 |
| 76 | Function as a member of a committee | 18 | 4.480 | 100 |
| 16 | Demonstrate a humanistic approach to instruction | 21 | 4.450 | 100 |
| 35 | Assess student cognitive performance | 21 | 4.450 | 100 |
| 74 | Locate the sources and variety of information needed to meet professional responsibilities | 21 | 4.450 | 100 |

Table 6 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "most important" (1-34) (Continued) | | | | |
| 67 | Analyze and organize subject matter into instructional units | 23.5 | 4.440 | 100 |
| 73 | Assist in the development of new professional knowledge and information | 23.5 | 4.440 | 100 |
| 88 | Demonstrate practice consistent with stated beliefs | 25 | 4.427 | 96 |
| 1 | Formulate and defend a consistent philosophy of industrial education | 26 | 4.417 | 96 |
| 7 | Make the distinction between the terms "industrial education", "industrial arts", and "vocational education" in meaning, scope, and activities | 27 | 4.402 | 96 |
| 34 | Construct and use performance-based criterion-referenced evaluation instruments | 28 | 4.387 | 93 |
| 41 | Interpret and use students' evaluation of instruction | 29.5 | 4.385 | 93 |
| 68 | Phase out nonfunctional units | 29.5 | 4.385 | 96 |
| 47 | Read and evaluate literature relative to research | 31.5 | 4.370 | 100 |
| 87 | Demonstrate organizational skills | 31.5 | 4.370 | 100 |
| 89 | Understand federal and state laws pertaining to industrial education | 33 | 4.354 | 96 |
| 36 | Assess student psychomotor performance | 34 | 4.353 | 85 |

Table 6 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "very important" (35-93) | | | | |
| 66 | Construct an instructional program consistent with performance based objectives | 35 | 4.330 | 100 |
| 26 | Relate current events associated with the area of specialization to classroom instruction | 36 | 4.313 | 96 |
| 56 | Write abstracts for research reports | 37 | 4.292 | 89 |
| 3 | Plan instruction to accommodate diverse student groups | 38 | 4.290 | 100 |
| 57 | Publish papers and/or research reports | 39 | 4.280 | 93 |
| 63 | Understand social, economic, and technological changes and their implications for industrial education curriculum development | 40 | 4.271 | 96 |
| 95 | Follow administrative practices, and principles | 43 | 4.260 | 100 |
| 17 | Diagnose and prescribe instruction based upon individual needs and abilities | 43 | 4.260 | 100 |
| 37 | Assess student affective performance | 43 | 4.260 | 100 |
| 46 | Make effective use of research and curriculum retrieval systems such as ERIC | 43 | 4.260 | 100 |
| 48 | Keep abreast of current research projects | 43 | 4.260 | 100 |
| 77 | Demonstrate awareness of the purpose and programs of professional associations by membership in those organizations | 46 | 4.229 | 96 |

Table 6 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "very important" (35-93) (Continued) | | | | |
| 44 | Conduct research using a variety of appropriate research skills and controls | 47 | 4.226 | 93 |
| 52 | Interpret and utilize research findings and implications for existing industrial education programs | 48 | 4.220 | 100 |
| 25 | Relate technological advances to laboratory and classroom instruction | 49 | 4.196 | 92 |
| 59 | Develop new curricula and programs based upon suggestions provided by advisory committees and/or practicing teachers | 50 | 4.194 | 93 |
| 28 | Supervise or manage student activities in the laboratory/classroom | 51 | 4.190 | 100 |
| 19 | Use texts, reference material, and special teaching aids | 53 | 4.180 | 100 |
| 82 | Lead a conference and/or a meeting | 53 | 4.180 | 100 |
| 86 | Communicate with a public audience | 53 | 4.180 | 100 |
| 51 | Conduct and encourage laboratory/classroom research | 55 | 4.156 | 96 |
| 70 | Understand the role of industrial education as it relates to career education | 56.5 | 4.150 | 100 |
| 11 | Use the information contained in professional journals and literature in industrial education | 56.5 | 4.150 | 100 |
| 8 | Understand the meaning of the word "technology" | 58.5 | 4.124 | 89 |
| 98 | Evaluate instructional staff | 58.5 | 4.124 | 89 |

Table 6 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| | Competencies rated "very important" (35-93) (Continued) | | | |
| 49 | Identify research problems for study | 60.5 | 4.115 | 96 |
| 50 | Write proposals for research and/or pilot projects | 60.5 | 4.115 | 96 |
| 53 | Interpret the findings of studies which have a bearing on the educational, psychological, and social problems of industrial education students | 64 | 4.110 | 100 |
| 9 | Select components of the instructional program from the multitude of existing curriculum materials | 64 | 4.110 | 100 |
| 12 | Use research findings regarding effectiveness of teaching methodology | 64 | 4.110 | 100 |
| 38 | Construct and use achievement tests | 64 | 4.110 | 100 |
| 40 | Assess the reliability of teacher-made tests | 64 | 4.110 | 100 |
| 43 | Understand statistical techniuques used for conducting research | 67 | 4.108 | 93 |
| 42 | Use the findings of follow-up studies for determining effectiveness of instruction | 68.5 | 4.070 | 100 |
| 39 | Assess the validity of teacher-made tests | 68.5 | 4.070 | 100 |
| 79 | Prepare and submit reports for national/state professional conferences | 70 | 4.042 | 96 |
| 92 | Communicate with industry | 71 | 4.040 | 100 |
| 29 | Perform guidance activities on an informal and/or formal basis | 72 | 4.032 | 93 |

Table 6 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "very important" (35-93) (Continued) | | | | |
| 62 | Develop interdisciplinary and multidisciplinary curricula | 73 | 4.031 | 96 |
| 65 | Organize and develop a curriculum around useful and meaningful units of experience that relate the instructional program to industrial practices | 74 | 4.030 | 100 |
| 21 | Use the micro-teaching method | 75 | 4.014 | 74 |
| 61 | Make use of program evaluation to develop curricula | 76.5 | 4.000 | 100 |
| 78 | Understand the responsibilities of a member of professional organizations | 76.5 | 4.000 | 100 |
| 58 | Develop a program evaluation and review technique (PERT) network | 78 | 3.963 | 81 |
| 64 | Combine jobs, operations, and related information into a course of study | 79.5 | 3.957 | 92 |
| 5 | Demonstrate a high level of technical performance in certain area(s) of specialization | 79.5 | 3.957 | 92 |
| 30 | Supervise and direct students' practice teaching | 81 | 3.951 | 82 |
| 45 | Utilize the computer to analyze and summarize data collected | 82.5 | 3.949 | 78 |
| 93 | Establish and maintain advisory committees | 82.5 | 3.949 | 78 |
| 80 | Demonstrate leadership in professional organizations | 84 | 3.930 | 100 |

Table 6 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "very important" (35-93) (Continued) | | | | |
| 97 | Plan physical facilities for industrial arts, and vocational education | 85 | 3.910 | 78 |
| 94 | Establish and support internships in industry and business | 86.5 | 3.871 | 85 |
| 6 | Understand all components of vocational education including agricultural education, business and office education, distributive education, health occupations, home economics, and trade and industrial education | 86.5 | 3.871 | 85 |
| 81 | Plan for and organize a youth group | 88 | 3,857 | 70 |
| 69 | Design and implement an adult education course or program | 89 | 3.808 | 78 |
| 20 | Develop audio-visual material for instructional purposes | 90 | 3.771 | 96 |
| 96 | Prepare budgets for operating a Department of Industrial Education | 91 | 3.769 | 78 |
| 60 | Make use of manpower data to develop curricula | 92 | 3.753 | 93 |
| 18 | Use methods to meet special needs of handicapped students | 93 | 3.679 | 81 |
| Competencies rated "important" (94-98) | | | | |
| 22 | Use audio-tutorial instruction | 94 | 3.595 | 74 |
| 33 | Select and use appropriate standardized tests to measure achievement | 95 | 3.565 | 85 |
| 91 | Relate to community organizations | 96 | 3.527 | 93 |

Table 6 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "important" (94-98) (Continued) | | | | |
| 23 | Develop and use programmed instruction | 97 | 3.500 | 74 |
| 24 | Use televised instruction in the laboratory/classroom | 98 | 3.459 | 74 |

most important; 70 competencies rated very important; and 5 competencies rated important. The data in Table 7 shows the item number, rank order of importance, cumulative point average (C.P.A.), and percentage of each of the 98 important professional education competencies.

## Discussion

The three subheadings discussed in this section include: (1) Comparison of competencies rated "most important"; (2) Comparison of competencies rated "important"; and (3) Comparison of the number of competencies in each of the three levels rated by the total respondents, and each of the three groups.

### 1. Comparison of competencies rated "most important":

After tabulating and comparing the competencies rated "most important" in Tables 5, 6, and 7, it may be noted that there were 13 competencies consistently rated "most important" by the respondents of each of the three groups of instructors in this study. These competencies are listed in Table 8.

Table 7. Relative importance which the department heads teaching graduate courses and/or undergraduate courses (N = 62) placed on a list of professional education competencies

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "most important" (1-22) | | | | |
| 96 | Prepare budgets for operating a Department of Industrial Education | 1 | 4.735 | 98 |
| 90 | Understand state certification requirements for industrial education teachers | 2 | 4.704 | 98 |
| 85 | Listen to colleagues and/or students | 3 | 4.680 | 100 |
| 83 | Work effectively with department heads and/or other administrative personnel | 4 | 4.643 | 98 |
| 27 | Stimulate and maintain students' interest throughout the instructional process | 5 | 4.580 | 100 |
| 84 | Communicate ideas or points of view to other instructors or administrators | 6.5 | 4.570 | 100 |
| 98 | Evaluate instructional staff | 6.5 | 4.570 | 100 |
| 88 | Demonstrate practice consistent with stated beliefs | 8 | 4.550 | 100 |

[a]Cumulative Point Average: The average was calculated by multiplying the ratings (3 through 5) by its corresponding percentage and then dividing the sum of this product by the sum of the rating percentages. The competencies were grouped according to the following criteria: C.P.A. = 5 to 4.34, most important; C.P.A. = 4.33 to 3.67, very important; and C.P.A. = 3.66 to 3, important.

[b]Denotes the percentage of the 62 respondents who judged the competency items equal to 3 or larger than 3.

Table 7 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| Competencies rated "most important" (1-22) (Continued) | | | | |
| 95 | Follow administrative practices, and principles | 9 | 4.500 | 100 |
| 55 | Write in a clear, concise manner acceptable to graduate-level standards | 10 | 4.485 | 97 |
| 2 | Recognize student needs and/or goals | 11 | 4.470 | 100 |
| 10 | Keep course(s) of study and instructional materials up to date | 12 | 4.460 | 100 |
| 87 | Demonstrate organizational skills | 13 | 4.450 | 100 |
| 15 | Specify instructional objectives based upon the needs of students | 14 | 4.440 | 100 |
| 14 | Establish evaluative criteria for a course | 15 | 4.418 | 98 |
| 28 | Supervise or manage student activities in the laboratory/classroom | 16 | 4.398 | 98 |
| 97 | Plan physical facilities for industrial arts, and vocational education | 17 | 4.389 | 95 |
| 67 | Analyze and organize subject matter into instructional units | 18 | 4.388 | 98 |
| 65 | Organize and develop a curriculum around useful and meaningful units of experience that relate the instructional program to industrial practices | 19 | 4.383 | 94 |
| 59 | Develop new curricula and programs based upon suggestions provided by advisory committees and/or practicing teachers | 20.5 | 4.347 | 95 |
| 4 | Demonstrate a high level of knowledge of subject matter | 20.5 | 4.347 | 98 |
| 16 | Demonstrate a humanistic approach to instruction | 22 | 4.340 | 100 |

Table 7 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| | Competencies rated "very important" (24-93) | | | |
| 32 | Understand basic principles of educational testing and measurement | 24 | 4.330 | 100 |
| 7 | Make the distinction between the terms "industrial education", "industrial arts", and "vocational education" in meaning, scope, and activities | 24 | 4.330 | 94 |
| 94 | Establish and support internships in industry and business | 24 | 4.330 | 94 |
| 76 | Function as a member of a committee | 26 | 4.326 | 92 |
| 68 | Phase out nonfunctional units | 27 | 4.323 | 93 |
| 71 | Understand current trends in industrial education | 28.5 | 4.320 | 100 |
| 82 | Lead a conference and/or a meeting | 28.5 | 4.320 | 97 |
| 89 | Understand federal and state laws pertaining to industrial education | 30 | 4.316 | 98 |
| 92 | Communicate with industry | 31 | 4.290 | 100 |
| 1 | Formulate and defend a consistent philosophy of industrial education | 32.5 | 4.286 | 98 |
| 70 | Understand the role of industrial education as it relates to career education | 32.5 | 4.286 | 98 |
| 19 | Use texts, reference material, and special teaching aids | 34 | 4.276 | 98 |
| 75 | Keep abreast of professional developments | 35 | 4.270 | 100 |

Table 7 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| | Competencies rated "very important" (24-93) (Continued) | | | |
| 72 | Demonstrate knowledge of current trends and concepts affecting industrial education | 36 | 4.260 | 100 |
| 77 | Demonstrate awareness of the purpose and programs of professional associations by membership in those organizations | 37 | 4.255 | 98 |
| 63 | Understand social, economic, and technological changes and their implications for industrial education curriculum development | 38 | 4.250 | 100 |
| 30 | Supervise and direct students' practice teaching | 39 | 4.247 | 85 |
| 8 | Understand the meaning of the word "technology" | 40 | 4.245 | 94 |
| 54 | Demonstrate competence to assist graduate students in writing thesis proposals and conducting research | 41 | 4.241 | 87 |
| 17 | Diagnose and prescribe instruction based upon individual needs and abilities | 42.5 | 4.224 | 98 |
| 35 | Assess student cognitive performance | 42.5 | 4.224 | 98 |
| 86 | Communicate with a public audience | 44 | 4.216 | 97 |
| 64 | Combine jobs, operations, and related information into a course of study | 45 | 4.207 | 92 |
| 66 | Construct an instructional program consistent with performance-based objectives | 46 | 4.204 | 98 |
| 29 | Perform guidance activities on an informal and/or formal basis | 47 | 4.190 | 100 |

Table 7 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| | Competencies rated "very important" (24-93) (Continued) | | | |
| 80 | Demonstrate leadership in professional organizations | 48 | 4.179 | 95 |
| 25 | Relate technological advances to laboratory and classroom instruction | 49 | 4.175 | 97 |
| 41 | Interpret and use students' evaluation of instruction | 50 | 4.174 | 92 |
| 74 | Locate the sources and variety of information needed to meet professional responsibilities | 51 | 4.170 | 94 |
| 36 | Assess student psychomotor performance | 52 | 4.163 | 98 |
| 93 | Establish and maintain advisory committees | 53 | 4.147 | 95 |
| 39 | Assess the validity of teacher-made tests | 54 | 4.130 | 92 |
| 61 | Make use of program evaluation to develop curricula | 55 | 4.126 | 95 |
| 40 | Assess the reliability of teacher-made tests | 56 | 4.122 | 90 |
| 78 | Understand the responsibilities of a member of professional organizations | 57 | 4.112 | 98 |
| 73 | Assist in the development of new professional knowledge and information | 58 | 4.110 | 100 |
| 11 | Use the information contained in professional journals and literature in industrial education | 59.5 | 4.084 | 95 |
| 37 | Assess student affective performance | 59.5 | 4.084 | 95 |

Table 7 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| 31 | Conduct in-service short-term workshops for teachers and industrial personnel | 61 | 4.067 | 90 |
| 3 | Plan instruction to accommodate diverse student groups | 62 | 4.064 | 94 |
| 5 | Demonstrate a high level of technical performance in certain area(s) of specialization | 63.5 | 4.063 | 95 |
| 34 | Construct and use performance-based criterion-referenced evaluation instruments | 63.5 | 4.063 | 95 |
| 9 | Select components of the instructional program from the multitude of existing curriculum materials | 65 | 4.060 | 100 |
| 38 | Construct and use achievement tests | 66 | 4.044 | 90 |
| 26 | Relate current events associated with the area of specialization to classroom instruction | 67 | 4.031 | 97 |
| 20 | Develop audio-visual material for instructional purposes | 68 | 4.011 | 94 |
| 51 | Conduct and encourage laboratory/classroom research | 69 | 4.000 | 97 |
| 62 | Develop interdisciplinary and multidisciplinary curricula | 70 | 3.979 | 95 |
| 53 | Interpret the findings of studies which have a bearing on the educational, psychological, and social problems of industrial education students | 71 | 3.978 | 89 |
| 52 | Interpret and utilize research findings and implications for existing industrial education programs | 72 | 3.968 | 95 |

Table 7 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| | Competencies rated "very important" (24-93) (Continued) | | | |
| 50 | Write proposals for research and/or pilot projects | 73 | 3.966 | 87 |
| 42 | Use the findings of follow-up studies for determining effectiveness of instruction | 74 | 3.957 | 94 |
| 49 | Identify research problems for study | 75 | 3.954 | 87 |
| 79 | Prepare and submit reports for national/state professional conferences | 76 | 3.944 | 90 |
| 46 | Make effective use of research and curriculum retrieval systems such as ERIC | 77 | 3.943 | 87 |
| 56 | Write abstracts for research reports | 78 | 3.929 | 84 |
| 48 | Keep abreast of current research projects | 79 | 3.915 | 94 |
| 47 | Read and evaluate literature relative to research | 80 | 3.895 | 95 |
| 58 | Develop a program evaluation and review technique (PERT) network | 81 | 3.885 | 78 |
| 81 | Plan for and organize a youth group | 82 | 3.881 | 84 |
| 91 | Relate to community organizations | 83 | 3.872 | 94 |
| 57 | Publish papers and/or research reports | 84.5 | 3.859 | 85 |
| 12 | Use research findings regarding effectiveness of teaching methodology | 84.5 | 3.859 | 92 |
| 69 | Design and implement an adult education course or program | 86 | 3.854 | 82 |

Table 7 (Continued)

| Item Number | Competencies | Rank | C.P.A.[a] | Percent[b] |
|---|---|---|---|---|
| | Competencies rated "very important" (24-93) (Continued) | | | |
| 60 | Make use of manpower data to develop curricula | 87 | 3.853 | 95 |
| 18 | Use methods to meet special needs of handicapped students | 88 | 3.845 | 84 |
| 13 | Understand the history of industrial education | 89 | 3.838 | 80 |
| 43 | Understand statistical techniques used for conducting research | 90 | 3.779 | 86 |
| 33 | Select and use appropriate standardized tests to measure achievement | 91 | 3.732 | 82 |
| 45 | Utilize the computer to analyze and summarize data collected | 92 | 3.695 | 82 |
| 44 | Conduct research using a variety of appropriate research skills and controls | 93 | 3.690 | 87 |
| | Competencies rated "important" (94-98) | | | |
| 6 | Understand all components of vocational education including agricultural education, business and office education, distributive education, health occupations, home economics, and trade and industrial education | 94 | 3.635 | 74 |
| 23 | Develop and use programmed instruction | 95 | 3.618 | 68 |
| 21 | Use the micro-teaching method | 96 | 3.557 | 79 |
| 24 | Use televised instruction in the laboratory/classroom | 97 | 3.479 | 73 |
| 22 | Use audio-tutorial instruction | 98 | 3.378 | 74 |

Table 8. Thirteen competencies consistently rated "most important" by the respondents of each of the three groups of instructors in this study

| Item Number | Competencies consistently rated "most important" |
|---|---|
| 2 | Recognize student needs and/or goals |
| 4 | Demonstrate a high level of knowledge of subject matter |
| 10 | Keep course(s) of study and instructional materials up to date |
| 14 | Establish evaluative criteria for a course |
| 15 | Specify instructional objectives based upon the needs of students |
| 16 | Demonstrate a humanistic approach to instruction |
| 27 | Stimulate and maintain students' interest throughout the instructional process |
| 55 | Write in a clear, concise manner acceptable to graduate-level standards |
| 67 | Analyze and organize subject matter into instructional units |
| 83 | Work effectively with department heads and/or other administrative personnel |
| 84 | Communicate ideas or points of view to other instructors or administrators |
| 85 | Listen to colleagues and/or students |
| 88 | Demonstrate practice consistent with stated beliefs |

In addition to the 13 competencies consistently rated "most important" in Table 8, the instructors teaching predominantly undergraduate courses rated 2 additional compe-

tencies "most important". The two competencies are listed in Table 9.

Table 9. Two additional competencies rated "most important" by the instructors teaching predominantly undergraduate courses

| Item Number | Additional competencies rated "most important" |
|---|---|
| 28 | Supervise or manage student activities in the laboratory/classroom |
| 32 | Understand basic principles of educational testing and measurement |

Besides the 13 competencies consistently rated "most important" in Table 8, the instructors teaching predominantly graduate courses rated 21 additional competencies "most important". These competencies are listed in Table 10.

Table 10. Twenty-one additional competencies rated "most important" by the instructors teaching predominantly graduate courses

| Item Number | Additional competencies rated "most important" |
|---|---|
| 1 | Formulate and defend a consistent philosophy of industrial education |
| 7 | Make the distinction between the terms "industrial education", "industrial arts" and "vocational education" in meaning, scope, and activities |
| 13 | Understand the history of industrial education |
| 31 | Conduct in-service short-term workshops for teachers and industrial personnel |

Table 10 (Continued)

| Item Number | Additional competencies rated "most important" |
|---|---|
| 32 | Understand basic principles of educational testing and measurement |
| 34 | Construct and use performance-based criterion-referenced evaluation instruments |
| 35 | Assess student cognitive performance |
| 36 | Assess student psychomotor performance |
| 41 | Interpret and use students' evaluation of instruction |
| 47 | Read and evaluate literature relative to research |
| 54 | Demonstrate competence to assist graduate students in writing thesis proposals and conducting research |
| 68 | Phase out nonfunctional units |
| 71 | Understand current trends in industrial education |
| 72 | Demonstrate knowledge of current trends and concepts affecting industrial education |
| 73 | Assist in the development of new professional knowledge and information |
| 74 | Locate the sources and variety of information needed to meet professional responsibilities |
| 75 | Keep abreast of professional developments |
| 76 | Function as a member of a committee |
| 87 | Demonstrate organizational skills |
| 89 | Understand federal and state laws pertaining to industrial education |
| 90 | Understand state certification requirements for industrial education teachers |

In addition to the 13 competencies consistently rated "most important" in Table 8, the department heads teaching graduate courses and/or undergraduate courses rated 9 additional competencies "most important". These competencies are listed in Table 11.

Table 11. Nine additional competencies rated "most important" by the department heads teaching graduate courses and/or undergraduate courses

| Item Number | Additional competencies rated "most important" |
|---|---|
| 28 | Supervise or manage student activities in the laboratory/classroom |
| 59 | Develop new curricula and programs based upon suggestions provided by advisory committees and/or practicing teachers |
| 65 | Organize and develop a curriculum around useful and meaningful units of experience that relate the instructional program to industrial practices |
| 87 | Demonstrate organizational skills |
| 90 | Understand state certification requirements for industrial education teachers |
| 95 | Follow administrative practices, and principles |
| 96 | Prepare budgets for operating a Department of Industrial Education |
| 97 | Plan physical facilities for industrial arts, and vocational education |
| 98 | Evaluate instructional staff |

It was observed from Tables 9 and 10 that item number 32, understand basic principles of educational testing and measurement, was rated "most important" by both the instructors teaching predominantly undergraduate courses and the instructors teaching predominantly graduate courses. Also, after comparing Tables 9 and 11, it may be observed that item number 28, supervise or manage student activities in the laboratory/classroom, was rated "most important" by both the instructors teaching predominantly undergraduate courses and the department heads. In addition, two other competency items were rated "most important" by both the instructors teaching predominantly graduate courses and the department heads. Those items were:

1. Item 87, demonstrate organizational skills; and
2. Item 90, understand state certification requirements for industrial education teachers

Upon comparison of the competencies rated "most important" by the total respondents in Table 4 and the competencies consistently rated "most important" in Table 5 by the respondents of each of the three groups of instructors, it was observed that the competencies in Table 4 surpass those of Table 5 by the following 3 competencies:

1. Item 28, supervise or manage student activities in the laboratory/classroom;
2. Item 32, understand basic principles of educational testing and measurement; and

3. Item 90, understand state certification requirements for industrial education teachers.

Item 28 was rated "most important" by both the instructors teaching predominantly undergraduate courses and the department heads (Tables 9 and 11). Item 32 was rated "most important" by both the instructors teaching predominantly undergraduate courses and the instructors teaching predominantly graduate courses (Tables 9 and 10). Item 90 was rated "most important" by both the instructors teaching predominantly graduate courses and the department heads (Tables 10 and 11).

2. Comparison of competencies rated "important":

Upon comparison of the competencies rated "important" in Tables 5, 6, and 7, it was observed that there were 3 competencies consistently rated "important" by the respondents of each of the three groups of instructors in this study. These competencies are listed in Table 12.

Table 12. Three competencies consistently rated "important" by the respondents of each of the three groups of instructors in this study

| Item Number | Competencies consistently rated "important" |
|---|---|
| 22 | Use audio-tutorial instruction |
| 23 | Develop and use programmed instruction |
| 24 | Use televised instruction in the laboratory/classroom |

In addition to the 3 competencies consistently rated "important" in Table 12, the instructors teaching predominantly undergraduate courses rated 5 additional competencies as "important". These competencies are listed in Table 13.

Table 13. Five additional competencies rated "important" by the instructors teaching predominantly undergraduate courses

| Item Number | Additional competencies rated "important" |
|---|---|
| 6 | Understand all components of vocational education including agricultural education, business and office education, distributive education, health occupations, home economics, and trade and industrial education |
| 13 | Understand the history of industrial education |
| 21 | Use the micro-teaching method |
| 33 | Select and use appropriate standardized tests to measure achievement |
| 79 | Prepare and submit reports for national/state professional conferences |

Besides the 3 competencies consistently rated "important" in Table 12, the instructors teaching predominantly graduate courses rated 2 additional competencies as "important". These competencies are listed in Table 14.

Table 14. Two additional competencies rated "important" by the instructors teaching predominantly graduate courses

| Item Number | Additional competencies rated "important" |
|---|---|
| 33 | Select and use appropriate standardized tests to measure achievement |
| 91 | Relate to community organizations |

In addition to the 3 competencies consistently rated "important" in Table 12, the department heads teaching graduate courses and/or undergraduate courses rated 2 additional competencies as "important". These competencies are listed in Table 15.

Table 15. Two additional competencies rated "important" by the department heads teaching graduate courses and/or undergraduate courses

| Item Number | Additional competencies rated "important" |
|---|---|
| 6 | Understand all components of vocational education including agricultural education, business and office education, distributive education, health occupations, home economics, and trade and industrial education |
| 21 | Use the micro-teaching method |

From Tables 13 and 14, it is readily noticed that item 33, select and use appropriate standardized tests to measure achievement, was rated "important" by both the instructors teaching predominantly undergraduate courses and the instructors teaching predominantly graduate courses. Data reported in Tables 13 and 15 indicate two other competency items were rated "important" by both the instructors teaching predominantly undergraduate courses and the department heads:

1. Item 6, understand all components of vocational education including agricultural education, business and office education, distributive education, health occupations, home economics, and trade and industrial education.
2. Item 21, use the micro-teaching method.

In addition, upon comparison of Tables 14 and 15, it was observed that no competencies were rated consistently "important" by both the instructors teaching predominantly graduate courses and the department heads.

Upon comparison of the competencies rated "important" by the total respondents in Table 4 and the competencies consistently rated "important" in Table 12 by the respondents of each of the three groups of instructors, it was observed that the competencies in Table 4 surpass those of Table 12 by the following 4 competencies:

1. Item 6, understand all components of vocational education including agricultural education, business and office education, distributive education, health occupations, home economics, and trade and industrial education;
2. Item 13, understand the history of industrial education;
3. Item 21, use the micro-teaching method; and
4. Item 33, select and use appropriate standardized tests to measure achievement.

The above 4 competencies were rated "important" by the instructors teaching predominantly undergraduate courses (Table 13). Item 33 was rated "important" only by the instructors teaching predominantly graduate courses (Table 14). Items 6 and 21 were rated "important" by the department heads (Table 15).

3. Comparison of the number of competencies in each of the three levels rated by the total respondents, and each of the three groups

The number of competencies in each of the three levels rated by the total respondents, and each of the three groups of instructors in this study were examined and compared. These competencies and their corresponding numbers which were listed in Tables 4, 5, 6, and 7 are now summarized in Table 16.

Table 16. The number of competencies in each of the three levels rated by the total respondents, and each of the three groups of instructors in this study

| | Three levels of competencies | | |
|---|---|---|---|
| | Competencies rated "most important" | Competencies rated "very important" | Competencies rated "important" |
| 1. Total respondents | 16 | 75 | 7 |
| 2. Instructors teaching predominantly undergraduate courses | 15 | 73 | 8 |
| 3. Instructors teaching predominantly graduate courses | 34 | 59 | 5 |
| 4. Department heads | 22 | 70 | 5 |

In view of Table 16, the following observations were made:

1. Among the judgments of the three groups of instructors, the judgments of the instructors teaching predominantly undergraduate courses were the closest to those of the total respondents in terms of each of the three levels of competencies. Next came the department heads who were followed by the instructors teaching predominantly graduate courses.
2. Among the three groups of instructors, those teaching predominantly graduate courses have the highest number (34) of competencies rated "most important". The department heads have the second highest number (22) of competencies rated "most important". The instructors teaching predominantly undergraduate courses have the lowest number (15) of competencies rated "most important".
3. Among the three groups of instructors, those teaching predominantly undergraduate courses have the highest number (73) of competencies rated "very important". The department heads have the second highest number (70) of competencies rated "very important". The instructors teaching predominantly graduate courses have the lowest number (59)

of competencies rated "very important".

4. Among the three groups of instructors, those teaching predominantly undergraduate courses have the highest number (8) of competencies rated "important". The instructors teaching predominantly graduate courses and the department heads have the second highest number (5) of competencies rated "important".

## Testing the Hypothesis

The hypothesis was tested for the twenty-two factors identified through factor pattern matrix of factor analysis. The twenty-two factors encompassing selected professional education competencies identified in this study are shown in Table 17. The name of each of the twenty-two factors was assigned based upon the competencies encompassed in each factor. The factor pattern matrix shows that competency item 31 can either be classified in factor 12 or factor 15, that competency item 27 can either be classified in factor 16 or factor 2, and that competency item 13 can either be classified in factor 20, or factor 19.

Each of the twenty-two factors was tested to examine if there was a significant difference of the mean at the .05 level of confidence among the judgments of the three groups of instructors in this study. If so, the Scheffé Method of

Table 17. Twenty-two factors encompassing selected professional education competencies identified in this study

| Item | Factors |
|---|---|
| | 1. Testing and Measurement |
| 32 | Understand basic principles of educational testing and measurement |
| 38 | Construct and use achievement tests |
| 39 | Assess the validity of teacher-made tests |
| 40 | Assess the reliability of teacher-made tests |
| | 2. Public and Human Relations |
| 16 | Demonstrate a humanistic approach to instruction |
| 83 | Work effectively with department heads and/or other administrative personnel |
| 84 | Communicate ideas or points of view to other instructors or administrators |
| 85 | Listen to colleagues and/or students |
| 86 | Communicate with a public audience |
| 87 | Demonstrate organizational skills |
| | 3. Research Knowledge and Techniques |
| 43 | Understand statistical techniques used for conducting research |
| 44 | Conduct research using a variety of appropriate research skills and controls |
| 45 | Utilize the computer to analyze and summarize data collected |
| 49 | Identify research problems for study |

Table 17 (Continued)

| Item | Factors |
|---|---|
| | 4. Writing Proposals for Research and Reports |
| 50 | Write proposals for research and/or pilot projects |
| 51 | Conduct and encourage laboratory/classroom research |
| 54 | Demonstrate competence to assist graduate students in writing thesis proposals and conducting research |
| 55 | Write in a clear, concise manner acceptable to graduate-level standards |
| 56 | Write abstracts for research reports |
| 57 | Publish papers and/or research reports |
| 58 | Develop a program evaluation and review technique (PERT) network |
| | 5. Leadership in Professional Organizations/Conferences |
| 79 | Prepare and submit reports for national/state professional conferences |
| 80 | Demonstrate leadership in professional organizations |
| 81 | Plan for and organize a youth group |
| 82 | Lead a conference and/or a meeting |
| 91 | Relate to community organizations |
| | 6. Instructional Strategies |
| 20 | Develop audio-visual material for instructional purposes |
| 21 | Use the micro-teaching method |
| 22 | Use audio-tutorial instruction |
| 23 | Develop and use programmed instruction |

Table 17 (Continued)

| Item | Factors |
|---|---|
| | 6. Instructional Strategies (Continued) |
| 24 | Use televised instruction in the laboratory/classroom |
| | 7. Membership in Professional Organizations |
| 76 | Function as a member of a committee |
| 77 | Demonstrate awareness of the purpose and programs of professional associations by membership in those organizations |
| 78 | Understand the responsibilities of a member of professional organizations |
| | 8. Development of New Knowledge and Programs |
| 9 | Select components of the instructional program from the multitude of existing curriculum materials |
| 33 | Select and use appropriate standardized tests to measure achievement |
| 53 | Interpret the findings of studies which have a bearing on the educational, psychological, and social problems of industrial education students |
| 69 | Design and implement an adult education course or program |
| 73 | Assist in the development of new professional knowledge and information |
| 74 | Locate the sources and variety of information needed to meet professional responsibilities |
| 75 | Keep abreast of professional developments |

Table 17 (Continued)

| Item | Factors |
|---|---|
| | 9. Understanding Current Trends and Role of Industrial Education |
| 29 | Perform guidance activities on an informal and/or formal basis |
| 70 | Understand the role of industrial education as it relates to career education |
| 71 | Understand current trends in industrial education |
| 72 | Demonstrate knowledge of current trends and concepts affecting industrial education |
| | 10. Reading and Evaluating Research Report |
| 46 | Make effective use of research and curriculum retrieval systems such as ERIC |
| 47 | Read and evaluate literature relative to research |
| 48 | Keep abreast of current research projects |
| | 11. Assessing Student Performances |
| 14 | Establish evaluative criteria for a course |
| 30 | Supervise and direct students' practice teaching |
| 35 | Assess student cognitive performance |
| 36 | Assess student psychomotor performance |
| 37 | Assess student affective performance |
| 41 | Interpret and use students' evaluation of instruction |

Table 17 (Continued)

| Item | Factors |
|---|---|
| | 12. Understanding Federal and State Laws Pertaining to Industrial Education |
| 6 | Understand all components of vocational education including agricultural education, business and office education, distributive education, health occupations, home economics, and trade and industrial education |
| 31 | Conduct in-service short-term workshops for teachers and industrial personnel |
| 88 | Demonstrate practice consistent with stated beliefs |
| 89 | Understand federal and state laws pertaining to industrial education |
| 90 | Understand state certification requirements for industrial education teachers |
| | 13. Following Administrative Practices and Principles |
| 95 | Follow administrative practices, and principles |
| 96 | Prepare budgets for operating a Department of Industrial Education |
| 97 | Plan physical facilities for industrial arts, and vocational education |
| 98 | Evaluate instructional staff |
| | 14. Communicating with Industry |
| 42 | Use the findings of follow-up studies for determining effectiveness of instruction |
| 92 | Communicate with industry |
| 93 | Establish and maintain advisory committees |
| 94 | Establish and support internships in industry and business |

Table 17 (Continued)

| Item | Factors |
|---|---|
| | 15. Developing Curricula |
| 59 | Develop new curricula and programs based upon suggestions provided by advisory committees and/or practicing teachers |
| 60 | Make use of manpower data to develop curricula |
| 61 | Make use of program evaluation to develop curricula |
| 62 | Develop interdisciplinary and multidisciplinary curricula |
| | 16. Relating Technological Advances and Current Events to Classroom Instruction |
| 19 | Use texts, reference material, and special teaching aids |
| 25 | Relate technological advances to laboratory and classroom instruction |
| 26 | Relate current events associated with the area of specialization to classroom instruction |
| 27 | Stimulate and maintain students' interest throughout the instructional process |
| | 17. Constructing Performance-Based Objectives |
| 15 | Specify instructional objectives based upon the needs of students |
| 34 | Construct and use performance-based criterion-referenced evaluation instruments |
| 66 | Construct an instructional program consistent with performance-based objectives |
| 67 | Analyze and organize subject matter into instructional units |

Table 17 (Continued)

| Item | Factors |
|---|---|
| | 18. Using Research Findings and Implications |
| 10 | Keep course(s) of study and instructional materials up to date |
| 11 | Use the information contained in professional journals and literature in industrial education |
| 12 | Use research findings regarding effectiveness of teaching methodology |
| 52 | Interpret and utilize research findings and implications for existing industrial education programs |
| | 19. Demonstrating a High Level of Knowledge and Technical Performance in Certain Area(s) of Specialization |
| 4 | Demonstrate a high level of knowledge of subject matter |
| 5 | Demonstrate a high level of technical performance in certain area(s) of specialization |
| 28 | Supervise or manage student activities in the laboratory/classroom |
| 64 | Combine jobs, operations, and related information into a course of study |
| 65 | Organize and develop a curriculum around useful and meaningful units of experience that relate the instructional program to industrial practices |
| | 20. Understanding the Meaning, Philosophy, and History of Industrial Education |
| 1 | Formulate and defend a consistent philosophy of industrial education |
| 7 | Make the distinction between the terms "industrial education", "industrial arts", and "vocational education" in meaning, scope, and activities |

Table 17 (Continued)

| Item | Factors |
|---|---|
| | 20. Understanding the Meaning, Philosophy, and History of Industrial Education (Continued) |
| 8 | Understand the meaning of the word "technology" |
| 13 | Understand the history of industrial education |
| | 21. Diagnosing and Prescribing Instruction Based upon Student Needs and Abilities |
| 2 | Recognize student needs and/or goals |
| 3 | Plan instruction to accommodate diverse student groups |
| 17 | Diagnose and prescribe instruction based upon individual needs and abilities |
| 18 | Use methods to meet special needs of handicapped students |
| 63 | Understand social, economic, and technological changes and their implications for industrial education curriculum development |
| | 22. Phasing Out Nonfunctional Units |
| 68 | Phase out nonfunctional units |

Multiple Comparisons (Ferguson, 1966, pp. 296-297) was employed to determine between which particular groups the difference occurred. Each competency item included in a factor to which the Scheffé method was applied was further tested to determine if there was a significant difference of the mean between any two of the three groups of instructors.

Twenty-two sub-hypotheses in the null form were tested. The results of the analysis are presented after each sub-hypothesis.

SUB-HYPOTHESIS 1: It was hypothesized that there would be no significant difference among the judgmements of the three groups of instructors concerning Factor 1, Testing and Measurement, encompassing selected professional education competency items (32, 38, 39, and 40).

The data in Table 18 shows the results of the analysis of variance relating to Sub-hypothesis 1. The sub-hypothesis was not rejected at the P = .10 level of significance which led to the determination that no significant difference existed as measured on Factor 1 among the judgments of the three groups.

The critical values of F (2, 292) at the .10, .05, and .01 level of confidence are 2.31, 3.03, and 4.69, respectively. The observed value of F in any analysis of variance table was compared to the above critical values of F (2, 292). If the observed value of F was equal to or larger than 2.31,

Table 18. Analysis of variance on Factor 1, Testing and Measurement

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 20.0693 | 2 | 10.0346 | 1.2108 |
| Within Groups | 2419.9172 | 292 | 8.2874 | |
| Total | 2439.9865 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 15.90 | 2.95 |
| Graduate | 27 | 16.81 | 2.40 |
| Department Heads | 62 | 16.02 | 2.81 |

3.03, or 4.69, these indicated that a significant difference between two means of any of the three groups at the .10, .05, or .01 level of confidence existed.

SUB-HYPOTHESIS 2: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 2, Public and Human Relations, encompassing selected professional education competency items (16, 83, 84, 85, 86, and 87).

As shown in Table 19, Sub-hypothesis 2 was rejected at the P = .01 level of significance. Multiple comparisons,

Table 19. Analysis of variance on Factor 2, Public and Human Relations

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 166.1569 | 2 | 83.0784 | 5.9679* |
| Within Groups | 4064.8804 | 292 | 13.9208 | |
| Total | 4231.0373 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 25.06 | 4.05 |
| Graduate | 27 | 26.48 | 2.56 |
| Department Heads | 62 | 26.77 | 2.97 |

*$P \leq .01$.

as shown in Table 20, were then computed according to the Scheffé method. Evaluation of these comparisons led to the following findings:

1. Of the three comparisons in Table 20, there was only one significant difference as measured on Factor 2 and its encompassing items (83, 84, and 87); that was the difference between the instructors teaching predominantly undergraduate courses and the department heads. For this

Table 20. Multiple comparisons of the means of the three groups of instructors as measured on Factor 2, Public and Human Relations, and its encompassing items (83, 84, 86, and 87)

| Factor and item number[a] | Instructors | | | Comparisons | | |
|---|---|---|---|---|---|---|
| | Under-graduate | Graduate | Dept. Heads | Undergraduate vs. Graduate | Undergraduate vs. Dept. Heads | Graduate vs. Dept. Heads |
| | | | | F-ratio | | |
| Factor 2 | 25.06 | 26.48 | 26.77 | 3.4577 | 10.0104*** | .1136 |
| 83 | 4.26 | 4.41 | 4.60 | .8051 | 8.2583** | 1.0178 |
| 84 | 4.32 | 4.52 | 4.56 | 1.7336 | 4.9840* | .0546 |
| 86 | 3.70 | 4.19 | 4.15 | 5.9199* | 9.9680*** | .0311 |
| 87 | 4.05 | 4.37 | 4.45 | 3.3659 | 10.4994*** | .1658 |

[a]83 = Work effectively with department heads and/or other administrative personnel, 84 = communicate ideas or points of view to other instructors or administrators, 86 = communicate with a public audience, 87 = demonstrate organizational skills.

*$P \leq .10$.

**$P \leq .05$.

***$P \leq .01$.

comparison, the significance level was established at the .01 level for Factor 2 and item 87; at the .05 level for item 83; and at the .10 level for item 84. Based upon the group means, the department heads judged Factor 2 including items 83, 84, and 87 to be more important than did the instructors teaching predominantly undergraduate courses.

2. Department heads and those instructors who teach predominantly graduate courses judged item 86 to be more important than did those instructors who teach predominantly undergraduate courses. For this comparison, the significance was established at the .10 level between the first group and third group; and at the .01 level between the second group and third group. However, no significant difference was found for item 86 between the first group and the second group.

Items which did not attain significant difference among the judgments of the three groups were not included in multiple comparisons. For example, items 16 and 85, which were encompassed in Factor 2, were not included in Table 20 for multiple comparisons in order to indicate that there were no significant differences as measured on the two items among the judgments of the three groups.

By using the Scheffé method, the critical values of $F'(2, 292)$ at the .10, .05, and .01 level of confidence are

4.62 ( = 2 x 2.31), 6.06 ( = 2 x 3.03), and 9.38 ( = 2 x 4.69), respectively. The observed value of F in any multiple comparisons table was compared to the above critical values of F'(2, 292). If the observed value of F was equal to or larger than 4.62, 6.06, or 9.38, these indicated that a significant difference between two means of any of the three groups at the .10, .05, or .01 level of confidence existed.

SUB-HYPOTHESIS 3: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 3, Research Knowledge and Techniques, encompassing selected professional education competency items (43, 44, 45, and 49).

The data in Table 21 shows the results of the statistical testing of Sub-hypothesis 3 which was rejected at the P = .05 level of significance. Table 22 depicts the multiple comparisons which were made on group means. Based on the comparisons, the following observations were made:

1. Of the three comparisons in Table 22, there was only one significant difference as measured on Factor 3; that was the difference between the instructors teaching predominantly undergraduate courses and those teaching predomininantly graduate courses. For this comparison, the significance was established at the .05 level. Based

Table 21. Analysis of variance on Factor 3, Research Knowledge and Techniques

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 102.2115 | 2 | 51.1058 | 4.2204* |
| Within Groups | 3535.9037 | 292 | 12.1093 | |
| Total | 3638.1152 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 13.50 | 3.61 |
| Graduate | 27 | 15.56 | 3.15 |
| Department Heads | 62 | 13.94 | 3.14 |

*$p \leq .05$.

upon the group means, the instructors teaching predominantly graduate courses judged this factor to be more important than did those teaching predominantly undergraduate courses.

2. The instructors teaching predominantly graduate courses judged Item 44 to be more important than did the other two groups. For this comparison, the significance was established at the .01 level between the instructors teaching predominantly undergraduate courses and those

Table 22. Multiple comparisons of the means of the three groups of instructors as measured on Factor 3, Research Knowledge and Techniques, and its encompassing items (44 and 49)

| Factor and item number[a] | Instructors | | | Comparisons | | |
|---|---|---|---|---|---|---|
| | Undergraduate | Graduate | Dept. Heads | Undergraduate vs. Graduate | Undergraduate vs. Dept. Heads | Graduate vs. Dept. Heads |
| | | | | F-ratio | | |
| Factor 3 | 13.50 | 15.56 | 13.94 | 8.3655** | .7619 | 4.0764 |
| 44 | 3.39 | 4.07 | 3.44 | 11.4198*** | .1233 | 7.7234** |
| 49 | 3.36 | 4.04 | 3.68 | 11.1834*** | 4.9445* | 2.4697 |

[a]44 = Conduct research using a variety of appropriate research skills and controls, 49 = identify research problems for study.

*$P \leq .10$.

**$P \leq .05$.

***$P \leq .01$.

teaching predominantly graduate courses; and at the .05 level between the instructors teaching predominantly graduate courses and the department heads. However, no significant difference was found for Item 44 between the instructors teaching predominantly undergraduate courses and the department heads.

3. The instructors teaching predominantly graduate courses and the department heads judged Item 49 to be more important than did the instructors teaching predominantly undergraduate courses. For this comparison, the significance was established at the .01 level between the first group and the third group; and at the .10 level between the second group and the third group. However, no significant difference was found for Item 49 between the first group and the second group.

SUB-HYPOTHESIS 4: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 4, Writing Proposals for Research and Reports, encompassing selected professional education competency items (50, 51, 54, 55, 56, 57, and 58).

Sub-hypothesis 4 was rejected at the P less than .01 level of significance as shown in Table 23. Multiple comparisons were made on group means as depicted in Table 24. The following statements were made on the basis of this

Table 23. Analysis of variance on Factor 4, Writing Proposals for Research and Reports

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 724.7595 | 2 | 362.3797 | 11.4567* |
| Within Groups | 9236.0744 | 292 | 31.6304 | |
| Total | 9960.8339 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 24.07 | 5.92 |
| Graduate | 27 | 28.89 | 4.45 |
| Department Heads | 62 | 26.50 | 5.00 |

*$P \leq .01$.

analysis:

1. The instructors teaching predominantly graduate courses and the department heads judged Factor 4 and its encompassing items (50, 51, 57, and 58) to be more important than did the instructors teaching predominantly undergraduate courses. For this comparison, the significance was established at the .01 level for Factor 4 including Items 50, 57, and 58; and at the .05 level for Item 51 between

the first group and the third group while at the .05 level for Factor 4, including Items 50, 51, and 58; and at the .10 level for Item 57 between the second group and the third group. However, no significant differences were found as measured on Factor 4 and all of its encompassing items between the first group and the second group.

2. Of the three comparisons in Table 24, there was only one significant difference as measured on Items 54 and 56; that was the difference between the instructors teaching predominantly undergraduate courses and those teaching predominantly graduate courses. For this comparison, the significance was established at the .01 level for both items. The latter group judged both items to be more important than did the former group.

SUB-HYPOTHESIS 5: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 5, Leadership in Professional Organizations/Conferences, encompassing selected professional education competency items (79, 80, 81, 82, and 91).

The analysis of variance statistics used in testing Sub-hypothesis 5 are provided in Table 25. The F-ratio of 15.1264 led to the rejection of the sub-hypothesis at the P much less than .01 level of significance. Multiple comparison

Table 24. Multiple comparisons of the means of the three groups of instructors as measured on Factor 4, Writing Proposals for Research and Reports, and its encompassing items (50, 51, 54, 56, 57, and 58)

| Factor and item number[a] | Instructors | | | Comparisons | | |
|---|---|---|---|---|---|---|
| | Under-graduate | Graduate | Dept. Heads | Undergraduate vs. Graduate | Undergraduate vs. Dept. Heads | Graduate vs. Dept. Heads |
| | | | | F-ratio | | |
| Factor 4 | 24.07 | 28.89 | 26.50 | 17.5333*** | 8.8968** | 3.3967 |
| 50 | 3.33 | 4.04 | 3.71 | 10.8134*** | 6.1842** | 1.8406 |
| 51 | 3.58 | 4.07 | 3.94 | 6.5971** | 7.1092** | .3659 |
| 54 | 3.62 | 4.41 | 3.89 | 11.7197*** | 2.7330 | 4.0009 |
| 56 | 3.20 | 4.04 | 3.56 | 12.2455*** | 4.4903 | 3.1506 |
| 57 | 3.26 | 4.11 | 3.60 | 14.5156*** | 4.6366* | 4.1174 |
| 58 | 2.86 | 3.59 | 3.42 | 10.5970*** | 12.4499** | .4528 |

[a]50 = Write proposals for research and/or pilot projects, 51 = conduct and encourage laboratory/classroom research, 54 = demonstrate competence to assist graduate students in writing thesis proposals and conducting research, 56 = write abstracts for research reports, 57 = publish papers and/or research reports, 58 = develop a program evaluation and review technique (PERT) network.

*$P \leq .10$.

**$P \leq .05$.

***$P \leq .01$.

Table 25. Analysis of variance on Factor 5, Leadership in Professional Organizations/Conferences

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 474.9199 | 2 | 237.4599 | 15.1264* |
| Within Groups | 4583.9411 | 292 | 15.6984 | |
| Total | 5058.8610 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 16.14 | 4.27 |
| Graduate | 27 | 18.67 | 1.90 |
| Department Heads | 62 | 19.35 | 3.50 |

*$P \leq .01$.

procedures were then computed, as shown in Table 26. The following observations were made based upon the values of F-ratio and the group means.

1. The instructors teaching predominantly graduate courses and the department heads judged Factor 5 and its encompassing items (79, 80, and 82) to be more important than did the instructors teaching predominantly undergraduate courses. For this comparison, the significance was established

Table 26. Multiple comparisons of the means of the three groups of instructors as measured on Factor 5, Leadership in Professional Organizations/Conferences, and its encompassing items (79, 80, 81, 82, and 91)

| Factor and item number[a] | Instructors | | | Comparisons | | |
|---|---|---|---|---|---|---|
| | Undergraduate | Graduate | Dept. Heads | Undergraduate vs. Graduate | Undergraduate vs. Dept. Heads | Graduate vs. Dept. Heads |
| | | | | F-ratio | | |
| Factor 5 | 16.41 | 18.67 | 19.35 | 7.7667** | 26.2400*** | .5540 |
| 79 | 3.13 | 3.96 | 3.76 | 15.0507*** | 17.3115*** | .6886 |
| 80 | 3.45 | 3.93 | 4.06 | 5.6848* | 18.3291*** | .3286 |
| 81 | 2.82 | 3.19 | 3.53 | 2.4818 | 18.2447*** | 1.6512 |
| 82 | 3.74 | 4.19 | 4.24 | 5.2030* | 12.8238*** | .0506 |
| 91 | 3.28 | 3.41 | 3.76 | .4097 | 11.1498*** | 2.3397 |

[a]79 = Prepare and submit reports for national/state professional conferences, 80 = demonstrate leadership in professional organizations, 81 = plan for and organize a youth group, 82 = lead a conference and/or a meeting, 91 = relate to community organizations.

*$P \leq .10$.

**$P \leq .05$.

***$P \leq .01$.

at the .05 level for Factor 5; at the .01 level for Item 79; and at the .10 level for Items 80 and 82 between the first group and the third group while at the .01 level for Factor 5 including Items 79, 80, and 82 between the second group and the third group. However, no significant differences were found as measured on Factor 5, Item 79 Item 80, and Item 82 between the first group and the second group.

2. Of the three comparisons in Table 26, there was only one that achieved a level of significance as measured on Items 81 and 91; that difference was between the instructors teaching predominantly undergraduate courses and the department heads. For this comparison, the significance was established at the .01 level for both items. The latter group judged both items to be more important than did the former group.

SUB-HYPOTHESIS 6: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 6, Instructional Strategies, encompassing selected professional education competency items (20, 21, 22, 23, and 24).

The data in Table 27 shows the results of the analysis of variance relative to Sub-hypothesis 6. The sub-hypothesis was not rejected at the P = .10 level of significance which led to

Table 27. Analysis of variance on Factor 6, Instructional Strategies

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Squares | F-ratio |
|---|---|---|---|---|
| Between Groups | 1.7691 | 2 | .8845 | .0592 |
| Within groups | 4363.3631 | 292 | 14.9430 | |
| Total | 4365.1322 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 16.02 | 3.94 |
| Graduate | 27 | 16.30 | 4.13 |
| Department Heads | 62 | 16.05 | 3.48 |

the determination that no significant difference existed as measured on Factor 6 among the judgments of the three groups.

SUB-HYPOTHESIS 7: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 7, Membership in Professional Organizations, encompassing selected professional education competency items (76, 77, and 78).

As shown in Table 28, Sub-hypothesis 7 was rejected at the P = .05 level of significance. Multiple comparisons, as

Table 28. Analysis of variance on Factor 7, Membership in Professional Organizations

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 42.4044 | 2 | 21.2022 | 3.6253* |
| Within Groups | 1707.7448 | 292 | 5.8484 | |
| Total | 1750.1492 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 11.66 | 2.54 |
| Graduate | 27 | 12.63 | 1.62 |
| Department Heads | 62 | 12.40 | 2.27 |

*$P \leq .05$.

shown in Table 29, were then computed. Evaluation of these comparisons led to the determinations indicated below.

1. No significant difference was found among the judgments of the three groups of instructors concerning Factor 7.

2. Of the three comparisons in Table 29, there was only one that reached a level of significance as measured on Item 76; that was the difference between the instructors

Table 29. Multiple comparisons of the means of the three groups of instructors as measured on Factor 7, Membership in Professional Organizations, and its encompassing items (76 and 77)

| Factor and item number[a] | Instructors | | | Comparisons | | |
|---|---|---|---|---|---|---|
| | Undergraduate | Graduate | Dept. Heads | Undergraduate vs. Graduate | Undergraduate vs. Dept. Heads | Graduate vs. Dept. Heads |
| | | | | F-ratio | | |
| Factor 7 | 11.66 | 12.63 | 12.40 | 3.8404 | 4.4622 | .1701 |
| 76 | 3.98 | 4.48 | 4.11 | 6.2727* | .8465 | 2.7063 |
| 77 | 3.86 | 4.15 | 4.21 | 2.3392 | 6.8025* | .0789 |

[a]76 = Function as a member of a committee, 77 = demonstrate awareness of the purpose and programs of professional associations by membership in those organizations.

*$P \leq .05$.

teaching predominantly undergraduate courses and those teaching predominantly graduate courses. For this comparison, the significance was established at the .05 level. The latter group judged this item to be more important that did the former group.

3. Again, of the three comparisons in Table 29, there was only one that showed a significant difference as measured on Item 77; that was the difference between the instructors teaching predominantly undergraduate courses and the department heads. This item was judged significantly different at the .05 level between the two groups. The latter group judged this item to be more important than did the former group.

SUB-HYPOTHESIS 8: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 8, Development of New Knowledge and Programs, encompassing selected professional education competency items (9, 33, 53, 69, 73, 74, and 75).

The data in Table 30 shows the results of the statistical testing of Sub-hypothesis 8 which was rejected at the P less than .01 level of significance. Table 31 depicts the multiple comparisons which were made on group means. Based on the comparisons, including the group means and the values of F-ratio,

Table 30. Analysis of variance on Factor 8, Development of New Knowledge and Programs

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 339.9122 | 2 | 169.9561 | 9.0645* |
| Within Groups | 5474.9217 | 292 | 18.7497 | |
| Total | 5814.8339 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 25.14 | 4.65 |
| Graduate | 27 | 28.15 | 2.96 |
| Department Heads | 62 | 27.08 | 3.65 |

*$P < .01$.

the following observations were made:

1. The instructors teaching predominantly graduate courses and the department heads judged Factor 8 and its encompassing items (53 and 73) to be more important than did the instructors teaching predominantly undergraduate courses. Factor 8, Item 53, and Item 73 were judged to be significantly different at the .01 level between the first group and the third group. Factor 8 was judged to be significantly different at the .01 level; and Items 53 and 73, at the .10

Table 31. Multiple comparisons of the means of the three groups of instructors as measured on Factor 8, Development of New Knowledge and Programs, and its encompassing items (33, 53, 69, 73, 74, and 75)

| Factor and item number[a] | Instructors | | | Comparisons | | |
|---|---|---|---|---|---|---|
| | Undergraduate | Graduate | Dept. Heads | Undergraduate vs. Graduate | Undergraduate vs. Dept. Heads | Graduate vs. Dept. Heads |
| | | | | F-ratio | | |
| Factor 8 | 25.14 | 28.15 | 27.08 | 11.5349*** | 9.5661*** | 1.1485 |
| 33 | 2.85 | 3.26 | 3.37 | 3.2254 | 10.3582*** | .1829 |
| 53 | 3.43 | 4.11 | 3.76 | 12.5618 | 5.9063* | 2.6221 |
| 69 | 3.03 | 3.26 | 3.47 | .9301 | 6.7958 | .6109 |
| 73 | 3.83 | 4.44 | 4.11 | 12.3167*** | 5.1811* | 2.8402 |
| 74 | 3.90 | 4.44 | 4.03 | 8.7363** | 1.0108 | 3.9683 |
| 75 | 4.07 | 4.52 | 4.27 | 8.2004** | 3.2339 | 1.9943 |

[a]33 = Select and use appropriate standardized tests to measure achievement, 53 = interpret the findings of studies which have a bearing on the educational, psychological, and social problems of industrial education students, 69 = design and implement an adult education course or program, 73 = assist in the development of new professional knowledge and information, 74 = locate the sources and variety of information needed to meet professional responsibilities, 75 = keep abreast of professional developments.

*$P \leq .10$.
**$P \leq .05$.
***$P \leq .01$.

level between the second group and the third group. However, there were no significant differences as measured on Factor 8 and all of its encompassing items between the first group and the second group.

2. Of the three comparisons in Table 31, there was only one that showed a significant difference as measured on Items 33 and 69; that was the difference between the instructors teaching predominantly undergraduate courses and the department heads. Items 33 and 69 were judged to be significantly different at the .01 and .05 level, respectively, between the two groups. The latter group judged both items to be more important than did the former group.

3. Again, of the three comparisons in Table 31, there was only one that reached a significant difference as measured on Items 74 and 75; that was the difference between the instructors teaching predominantly undergraduate courses and those teaching predominantly graduate courses. Both items were rated to be significantly different at the .05 level between the two groups. The latter group judged both items to be more important than did the former group.

SUB-HYPOTHESIS 9: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 9, Understanding Current Trends and Role of Industrial Education, encompassing

selected professional education competency items (29, 70, 71, and 72).

The data in Table 32 shows the results of the analysis of variance relating to Sub-hypothesis 9. The sub-hypothesis was not

Table 32. Analysis of variance on Factor 9, Understanding Current Trends and Role of Industrial Education

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 23.3722 | 2 | 11.6861 | 1.9167 |
| Within Groups | 1780.3431 | 292 | 6.0971 | |
| Total | 1803.7153 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 16.40 | 2.55 |
| Graduate | 27 | 17.00 | 2.24 |
| Department Heads | 62 | 17.02 | 2.27 |

rejected at the P = .10 level of significance which led to the determination that no significant difference existed as measured on Factor 9 among the judgments of the three groups.

SUB-HYPOTHESIS 10: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 10, Reading and Evaluating Research Report, encompassing selected professional education competency items (46, 47, and 48).

Sub-hypothesis 10 was rejected at the P less than .01 level of significance as shown in Table 33. Multiple comparisons were made on group means as depicted in Table 34. Based upon the values of F-ratio and the group means, the following findings were made:

The instructors teaching predominantly graduate courses judged Factor 10 and all of its encompassing items to be more important than did both the instructors teaching predominantly undergraduate courses and the department heads. Factor 10 and all of its encompassing items were judged to be significantly different at the .01 level between the first group and the second group; and at the .05 level between the first group and the third group. However, no significant differences were found as measured on Factor 10 and all of its encompassing items between the second group and the third group.

SUB-HYPOTHESIS 11: It was hypothesized that there would be no significant difference among the judgements of the three groups of instructors concerning Factor 11, Assessing

Table 33. Analysis of variance on Factor 10, Reading and Evaluating Research Report

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 124.1029 | 2 | 62.0514 | 11.1784* |
| Within Groups | 1620.8937 | 292 | 5.5510 | |
| Total | 1744.9966 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 10.67 | 2.51 |
| Graduate | 27 | 12.89 | 1.67 |
| Department Heads | 62 | 11.27 | 2.05 |

*$P \leq .01$.

Student Performances, encompassing selected professional education competency items (14, 30, 35, 36, 37, and 41).

The analysis of variance statistics used in testing Sub-hypothesis 11 are provided in Table 35. The F-ratio of 3.2916 led to the rejection of the sub-hypothesis at the $P = .05$ level of significance. Multiple comparison procedures were then computed, as shown in Table 36. The following statements were made on the basis of this analysis:

Table 34. Multiple comparisons of the means of the three groups of instructors as measured on Factor 10, Reading and Evaluating Research Report, and its encompassing items (46, 47, and 48)

| Factor and item number[a] | Instructors | | | Comparisons | | |
|---|---|---|---|---|---|---|
| | Undergraduate | Graduate | Dept. Heads | Undergraduate vs. Graduate | Undergraduate vs. Dept. Heads | Graduate vs. Dept. Heads |
| | | | | F-ratio | | |
| Factor 10 | 10.67 | 12.89 | 11.27 | 21.1939** | 3.0907 | 8.8925* |
| 46 | 3.50 | 4.26 | 3.68 | 13.4101** | 1.5017 | 6.1538* |
| 47 | 3.60 | 4.37 | 3.81 | 18.5050** | 2.7480 | 7.7122* |
| 48 | 3.56 | 4.26 | 3.79 | 17.4142** | 3.7534 | 6.1856* |

[a]46 = Make effective use of research and curriculum retrieval systems such as ERIC, 47 = read and evaluate literature relative to research, 48 = keep abreast of current research projects.

*$P \leq .05$.

**$P \leq .01$.

Table 35. Analysis of variance on Factor 11, Assessing Student Performances

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Squares | F-ratio |
|---|---|---|---|---|
| Between Groups | 82.5732 | 2 | 41.2866 | 3.2916* |
| Within Groups | 3662.5319 | 292 | 12.5429 | |
| Total | 3745.1051 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 23.53 | 3.54 |
| Graduate | 27 | 24.93 | 3.97 |
| Department Heads | 62 | 24.55 | 3.36 |

*$P \leq .05$.

1. No significant difference was found among the judgments of the three groups of instructors concerning Factor 11.

2. Of the three comparisons in Table 36, there was only one that showed a significant difference as measured on Item 30; that was the difference between the instructors teaching predominantly undergraduate courses and the department heads. For this comparison, the significance was

Table 36. Multiple comparisons of the means of the three groups of instructors as measured on Factor 11, Assessing Student Performances, and its encompassing items (30 and 37)

| Factor and item number[a] | Instructors | | | Comparisons | | |
|---|---|---|---|---|---|---|
| | Undergraduate | Graduate | Dept. Heads | Undergraduate vs. Graduate | Undergraduate vs. Dept. Heads | Graduate vs. Dept. Heads |
| | | | | F-ratio | | |
| Factor 11 | 23.53 | 24.93 | 24.55 | 3.7302 | 3.9530 | .2165 |
| 30 | 3.20 | 3.48 | 3.87 | 1.0788 | 12.3324** | 1.6492 |
| 37 | 3.73 | 4.26 | 3.98 | 7.8798* | 3.5002 | 1.7329 |

[a] 30 = Supervise and direct students' practice teaching, 37 = assess student affective performance.

* $P \leq .05$.

** $P \leq .01$.

established at the .01 level between the two groups. The latter group judged Item 30 to be more important than did the former group.

3. Again, of the three comparisons in Table 36, there was only one that reached a significant difference as measured on Item 37; that was the difference between the instructors teaching predominantly undergraduate courses and those teaching predominantly graduate courses. This item was judged to be significantly different at the .05 level between the two groups. The latter group judged Item 37 to be more important than did the former group.

SUB-HYPOTHESIS 12: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 12, Understanding Federal and State Laws Pertaining to Industrial Education, encompassing selected professional education competency items (6, 31, 88, 89, and 90).

As shown in Table 37, Sub-hypothesis 12 was rejected at the P less than .01 level of significance. Multiple comparisons, as shown in Table 38, were then computed. Evaluation of these comparisons led to the following findings:

1. The instructors teaching predominantly graduate courses and the department heads judged Factor 12 and its encompassing items (89 and 90) to be more important than did

Table 37. Analysis of variance on Factor 12, Understanding Federal and State Laws Pertaining to Industrial Education

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 248.9458 | 2 | 124.4729 | 12.9393* |
| Within Groups | 2808.9661 | 292 | 9.6197 | |
| Total | 3057.9119 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 18.77 | 3.20 |
| Graduate | 27 | 21.22 | 2.93 |
| Department Heads | 62 | 20.52 | 2.81 |

*$P \leq .01$.

the instructors teaching predominantly undergraduate courses. Factor 12 was judged to be significantly different at the .01 level; and Items 89 and 90, at the .05 level between the first group and the third group. Factor 12, Item 89, and Item 90 were judged to be significantly different at the .01 level between the second group and the third group. However, there were no significant differences as measured on Factor 12, Item 89, and Item 90 between the first group and the second

Table 38. Multiple comparisons of the means of the three groups of instructors as measured on Factor 12, Understanding Federal and State Laws Pertaining to Industrial Education, and its encompassing items (6, 31, 89, and 90)

| Factor and item number[a] | Instructors | | | Comparisons | | |
|---|---|---|---|---|---|---|
| | Undergraduate | Graduate | Dept. Heads | Undergraduate vs. Graduate | Undergraduate vs. Dept. Heads | Graduate vs. Dept. Heads |
| | | | | F-ratio | | |
| Factor 12 | 18.77 | 21.22 | 20.52 | 14.8951** | 15.1718** | .9581 |
| 6 | 2.94 | 3.59 | 3.18 | 11.1663 | 3.0391 | 3.5006 |
| 31 | 3.70 | 4.48 | 3.87 | 13.5643** | 1.2864 | 6.5368* |
| 89 | 3.80 | 4.26 | 4.27 | 6.4028* | 13.3442** | .0024 |
| 90 | 4.06 | 4.56 | 4.65 | 7.7053* | 21.4189** | .1967 |

[a]6 = Understand all components of vocational education including agricultural education, business and office education, distributive education, health occupations, home economics, and trade and industrial education, 31 = conduct in-service short-term workshops for teachers and industrial personnel, 89 = understand federal and state laws pertaining to industrial education, 90 = understand state certification requirements for industrial education teachers.

*$P \leq .05$.

**$P \leq .01$.

group.

2. No significant difference was found as measured on Item 6 among the judgments of the three groups.

3. The instructors teaching predominantly graduate courses judged Item 31 to be more important than did both those teaching predominantly undergraduate courses and the department heads. This item was judged to be significantly different at the .01 level between the first group and the second group; and at the .05 level between the first group and the third group. However, no significant difference was found as measured on Item 31 between the second group and the third group.

SUB-HYPOTHESIS 13: It was hypothesized that there would be no significant difference among the judgements of the three groups of instructors concerning Factor 13, Following Administrative Practices and Principles, encompassing selected professional education competency items (95, 96, 97, and 98).

The data in Table 39 shows the results of the statistical testing of Sub-hypothesis 13 which was rejected at the P much less than the .01 level of significance. Table 40 depicts the Multiple comparisons which were made on group means. Based on the comparisons, including the values of F-ratio and the group means, the following observations were made:

Table 39. Analysis of variance on Factor 13, Following Administrative Practices and Principles

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 790.9274 | 2 | 395.4637 | 42.2508* |
| Within Groups | 2733.0930 | 292 | 9.3599 | |
| Total | 3524.0204 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 13.93 | 3.31 |
| Graduate | 27 | 14.74 | 2.90 |
| Department Heads | 62 | 18.00 | 2.08 |

*$P \leq .01$.

1. The department heads judged Factor 13 and its encompassing items (96 and 97) to be more important than did both the instructors teaching predominantly undergraduate courses and those teaching predominantly graduate courses. Factor 13, Item 96, and Item 97 were judged to be significantly different at the .01 level both between the first group and the second group and between the first group and the third group. However, no significant differences were

Table 40. Multiple comparisons of the means of the three groups of instructors as measured on Factor 13, Following Administrative Practices and Principles, and its encompassing items (95, 96, 97, and 98)

| Factor and item number[a] | Instructors | | | Comparisons | | |
|---|---|---|---|---|---|---|
| | Under-graduate | Graduate | Dept. Heads | Undergraduate vs. Graduate | Undergraduate vs. Dept. Heads | Graduate vs. Dept. Heads |
| | | | | F-ratio | | |
| Factor 13 | 13.93 | 14.74 | 18.00 | 1.6733 | 84.3418** | 21.3565** |
| 95 | 3.83 | 4.26 | 4.50 | 6.1646* | 29.8789** | 1.5131 |
| 96 | 3.23 | 3.26 | 4.68 | .0168 | 78.4398** | 29.6901** |
| 97 | 3.59 | 3.33 | 4.26 | 1.2882 | 17.0775** | 12.9861** |
| 98 | 3.28 | 3.89 | 4.56 | 7.3866* | 64.9334** | 7.0214* |

[a]95 = Follow administrative practices, and principles, 96 = prepare budgets for operating a Department of Industrial Education, 97 = plan physical facilities for industrial arts, and vocational education, 98 = evaluate instructional staff.

*$P \leq .05$.

**$P \leq .01$.

found as measured on Factor 13, Item 96, and Item 97 between the second group and the third group.

2. The instructors teaching predominantly graduate courses and the department heads judged Item 95 to be more important than did the instructors teaching predominantly undergraduate courses. For this comparison, the significance was established at the .05 level between the first group and the third group; and at the .01 level between the second group and the third group. However, no significant difference was found as measured on this item between the first group and the second group.

3. The department heads judged Item 98 to be more important than did both the instructors teaching predominantly undergraduate courses and those teaching predominantly graduate courses. Also, the third group judged this item to be more important than did the second group. Item 98 was judged to be significantly different at the .05 level both between the second group and the third group and between the first group and the third group; and at the .01 level between the first group and the second group.

SUB-HYPOTHESIS 14: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 14, Communicating with Industry, encompassing selected professional education

competency items (42, 92, 93, and 94).

The data in Table 41 shows the results of the analysis of variance relative to Sub-hypothesis 14. Based on the F-ratio of 10.0370, the sub-hypothesis was rejected at the P less than .01 level of significance. Multiple comparisons were made on group means as shown in Table 42. The following statements were made based upon the values of F-ratio and the

Table 41. Analysis of variance on Factor 14, Communicating with Industry

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 195.1676 | 2 | 97.5838 | 10.0370* |
| Within Groups | 2838.9477 | 292 | 9.7224 | |
| Total | 3034.1153 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 14.33 | 3.31 |
| Graduate | 27 | 15.07 | 3.00 |
| Department Heads | 62 | 16.34 | 2.44 |

*P $\leq$ .01.

Table 42. Multiple comparisons of the means of the three groups of instructors as measured on Factor 14, Communicating with Industry, and its encompassing items (92, 93, and 94)

| Factor and item number[a] | Instructors | | | Comparisons | | |
|---|---|---|---|---|---|---|
| | Undergraduate | Graduate | Dept. Heads | Undergraduate vs. Graduate | Undergraduate vs. Dept. Heads | Graduate vs. Dept. Heads |
| | | | | F-ratio | | |
| Factor 14 | 14.33 | 15.07 | 16.34 | 1.3445 | 19.8035** | 3.1203 |
| 92 | 3.97 | 4.04 | 4.29 | .1654 | 6.9007** | 1.6623 |
| 93 | 3.23 | 3.44 | 4.05 | .8688 | 26.4475*** | 5.7763* |
| 94 | 3.46 | 3.52 | 4.16 | .0689 | 18.7166*** | 6.1749** |

[a]92 = Communicate with industry, 93 = establish and maintain advisory committees, 94 = establish and support internships in industry and business.

*$P \leq .10$.

**$P \leq .05$.

***$P \leq .01$.

group means.

1. Of the three comparisons in Table 42, there was only one significant difference as measured on Factor 14 and its encompassing item (92); that was the difference between the instructors teaching predominantly undergraduate courses and the department heads. Factor 14 and Item 92 were judged to be significantly different between the two groups at the .01 and .05 level, respectively. The latter group judged Factor 14 and Item 92 to be more important than did the former group.

2. The department heads judged Items 93 and 94 to be more important than did both the instructors teaching predominantly undergraduate courses and those teaching predominantly graduate courses. The two items were judged to be significantly different at the .01 level between the first group and the second group, but between the first group and the third group at the .10 level for Item 93 and at the .05 level for Item 94. However, no significant differences were found as measured on the two items between the second group and the third group.

SUB-HYPOTHESIS 15: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 15, Developing Curricula, encompassing selected professional education

competency items (59, 60, 61 and 62).

The analysis of variance statistics used in testing Sub-hypothesis 15 are provided in Table 43. The F-ratio of 5.5531 led to the rejection of the hypothesis at the P = .01 level of significance. Multiple comparison procedures were then computed, as shown in Table 44. Based on these comparisons, several determinations were made as follows:

Of the three comparisons in Table 44, there was only one significant difference as measured on Factor 15 and its encompassing items (59 and 60); that was the difference between the instructors teaching predominantly undergraduate courses and the department heads. Factor 15 and Item 60 were judged to be significantly different at the .01 level; and Item 59, at the .10 level between the two groups. The latter group judged Factor 15, Item 59, and Item 60 to be more important than did the former group.

SUB-HYPOTHESIS 16: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 16, Relating Technological Advances and Current Events to Classroom Instruction, encompassing selected professional education competency items (19, 25, 26, and 27).

Sub-hypothesis 16 was not rejected at the P = .10 level of significance on the basis of the F-ratio of .1352 in Table 45. The analysis led to the determination that no

Table 43. Analysis of variance on Factor 15, Developing Curricula

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 89.2465 | 2 | 44.6232 | 5.5531* |
| Within Groups | 2346.4145 | 292 | 8.0357 | |
| Total | 2435.6610 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 14.61 | 2.82 |
| Graduate | 27 | 15.63 | 2.76 |
| Department Heads | 62 | 15.87 | 2.93 |

*$p \leq .01$.

significant difference existed as measured on Factor 16 among the three groups.

SUB-HYPOTHESIS 17: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 17, Constructing Performance-Based Objectives, encompassing selected professional education competency items (15, 34, 66, and 67).

Table 44. Multiple comparisons of the means of the three groups of instructors as measured on Factor 15, Developing Curricula, and its encompassing items (59 and 60)

| Factor and item number[a] | Instructors | | | Comparisons | | |
|---|---|---|---|---|---|---|
| | Under-graduate | Graduate | Dept. Heads | Undergraduate vs. Graduate | Undergraduate vs. Dept. Heads | Graduate vs. Dept. Heads |
| | | | | F-ratio | | |
| Factor 15 | 14.61 | 15.63 | 15.87 | 3.0907 | 9.4155** | .1348 |
| 59 | 3.92 | 4.04 | 4.24 | .4115 | 5.8417* | .9006 |
| 60 | 3.27 | 3.63 | 3.76 | 3.3652 | 12.4469** | .3458 |

[a]59 = Develop new curricula and programs based upon suggestions provided by advisory committees and/or practicing teachers, 60 = make use of manpower data to develop curricula.

*$P \leq .10$.

**$P \leq .01$.

Table 45. Analysis of variance on Factor 16, Relating Technological Advances and Current Events to Classroom Instruction

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 1.2186 | 2 | .6093 | .1352 |
| Within Groups | 1315.7508 | 292 | 4.5060 | |
| Total | 1316.9694 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 17.04 | 2.12 |
| Graduate | 27 | 17.07 | 2.20 |
| Department Heads | 62 | 16.89 | 2.10 |

The analysis of variance statistics used in testing Sub-hypothesis 17 are provided in Table 46. The sub-hypothesis was not rejected at the P = .10 level of significance based upon the F-ratio of 2.0604.

SUB-HYPOTHESIS 18: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 18, Using Research Findings and Implications, encompassing selected

Table 46. Analysis of variance on Factor 17, Constructing Performance-Based Objectives

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 25.0262 | 2 | 12.5131 | 2.0604 |
| Within Groups | 1773.3942 | 292 | 6.0733 | |
| Total | 1798.4204 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 16.49 | 2.53 |
| Graduate | 27 | 17.41 | 2.14 |
| Department Heads | 62 | 16.90 | 2.37 |

professional education competency items (10, 11, 12, and 52).

The data in Table 47 shows the results of the statistical testing of Sub-hypothesis 18 which was rejected at the P = .05 level of significance. Table 48 depicts the multiple comparisons which were made on the means of the three groups. Based upon the analysis of Table 48, the following observations were made:

Of the three comparisons in Table 48, there was only one significant difference as measured on Factor 18 and its

Table 47. Analysis of variance on Factor 18, Using Research Findings and Implications

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 43.3538 | 2 | 21.6769 | 4.3871* |
| Within Groups | 1442.7818 | 292 | 4.9410 | |
| Total | 1486.1356 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 15.65 | 2.23 |
| Graduate | 27 | 16.96 | 2.01 |
| Department Heads | 62 | 16.02 | 2.28 |

*$P \leq .05$.

encompassing items (12 and 52); that was the difference between the instructors teaching predominantly undergraduate courses and those teaching predominantly graduate courses. Factor 18 and Item 12 were judged to be significantly different at the .05 level; and item 52, at the .01 level between the two groups. The latter group judged Factor 18, Item 12, and Item 52 to be more important than did the former group.

Table 48. Multiple comparisons of the means of the three groups of instructors as measured on Factor 18, Using Research Findings and Implications, and its encompassing items (12 and 52)

| Factor and item number[a] | Instructors | | | Comparisons | | |
|---|---|---|---|---|---|---|
| | Undergraduate | Graduate | Dept. Heads | Undergraduate vs. Graduate | Undergraduate vs. Dept. Heads | Graduate vs. Dept. Heads |
| | | | | F-ratio | | |
| Factor 18 | 15.65 | 16.96 | 16.02 | 8.2909* | 1.3204 | 3.3636 |
| 12 | 3.65 | 4.11 | 3.71 | 7.5921* | .2579 | 4.5234 |
| 52 | 3.63 | 4.22 | 3.87 | 12.2640** | 4.0515 | 3.4005 |

[a] 12 = Use research findings regarding effectiveness of teaching methodology, 52 = interpret and utilize research findings and implications for existing industrial education programs.

*$P \leq .05$.

**$P \leq .01$.

SUB-HYPOTHESIS 19: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 19, Demonstrating a High Level of Knowledge and Technical Performance in Certain Area(s) of Specialization, encompassing selected professional education competency items (4, 5, 28, 64, and 65).

The data in Table 49 shows the results of the analysis of variance relating to Sub-hypothesis 19. The sub-hypothesis was not rejected at the P = .10 level of significance which led to the determination that no significant difference existed as measured on Factor 19 among the judgments of the three groups.

Table 49. Analysis of variance on Factor 19, Demonstrating a High Level of Knowledge and Technical Performance in Certain Area(s) of Specialization

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 20.8794 | 2 | 10.4397 | 1.4523 |
| Within Groups | 2099.0664 | 292 | 7.1886 | |
| Total | 2119.9458 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 21.17 | 2.55 |
| Graduate | 27 | 20.30 | 2.55 |
| Department Heads | 62 | 20.82 | 3.13 |

SUB-HYPOTHESIS 20: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 20, Understanding the Meaning, Philosophy, and History of Industrial Education, encompassing selected professional education competency items (1, 7, 8, and 13).

Sub-hypothesis 20 was not rejected at the P = .10 level of significance based upon the F-ratio of 2.0920, as shown in Table 50. The analysis led to the determination that no significant difference existed as measured on Factor 20 among the judgments of the three groups.

Table 50. Analysis of variance on Factor 20, Understanding the Meaning, Philosophy, and History of Industrial Education

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 36.0003 | 2 | 18.0002 | 2.0920 |
| Within Groups | 2512.4200 | 292 | 8.6042 | |
| Total | 2548.4203 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 15.12 | 3.00 |
| Graduate | 27 | 15.59 | 2.96 |
| Department Heads | 62 | 15.97 | 2.69 |

SUB-HYPOTHESIS 21: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 21, Diagnosing and Prescribing Instruction Based upon Student Needs and Abilities, encompassing selected professional education competency items (2, 3, 17, 18, and 63).

The data in Table 51 shows the results of the analysis of variance relative to Sub-hypothesis 21. The sub-hypothesis was not rejected at the P = .10 level of significance based upon the F-ratio of 1.7842. The analysis led to the determination that

Table 51. Analysis of variance on Factor 21, Diagnosing and Prescribing Instruction Based Upon Student Needs and Abilities

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | 27.7166 | 2 | 13.8583 | 1.7842 |
| Within Groups | 2268.0597 | 292 | 7.7673 | |
| Total | 2295.7763 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 19.74 | 2.74 |
| Graduate | 27 | 20.56 | 2.62 |
| Department Heads | 62 | 20.32 | 3.01 |

no significant difference existed as measured on Factor 21 among the judgments of the three groups.

SUB-HYPOTHESIS 22: It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning Factor 22, Phasing Out Non-functional Units, encompassing selected professional education competency item (68).

The analysis of variance statistics used in testing Sub-hypothesis 22 are provided in Table 52. The sub-

Table 52. Analysis of variance on Factor 22, Phasing out Nonfunctional Units

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F-ratio |
|---|---|---|---|---|
| Between Groups | .4527 | 2 | .2264 | .2668 |
| Within Groups | 247.7303 | 292 | .8484 | |
| Total | 248.1830 | 294 | | |

Means and standard deviations

| Source | Number | Mean | Standard Deviations |
|---|---|---|---|
| Undergraduate | 206 | 4.16 | .90 |
| Graduate | 27 | 4.30 | .87 |
| Department Heads | 62 | 4.16 | .99 |

hypothesis was not rejected at the P = .10 level of significance based upon the F-ratio of .2668.

## Discussion

The two subheadings discussed in this section include: (1) Factors judged not containing significant differences among the three groups; and (2) Factors judged containing significant differences among the three groups.

### 1. Factors judged not containing significant differences among the three groups

According to previous discussion, there were nine factors, including thirty-six competency items, that showed no significant differences at the .10 level among the judgments of the three groups of instructors. The nine factors were:

1. Testing and Measurement;
2. Instructional Strategies;
3. Understanding Current Trends and Role of Industrial Education;
4. Relating Technological Advances and Current Events to Classroom Instruction;
5. Constructing Performance-Based Objectives;
6. Demonstrating a High Level of Knowledge and Technical Performance in Certain Area(s) of Specialization;
7. Understanding the Meaning, Philosophy, and History of Industrial Education;

8. Diagnosing and Prescribing Instruction Based upon Student Needs and Abilities; and

9. Phasing out Nonfunctional Units.

2. Factors judged containing significant differences among the three groups

Based upon the F values in the twenty-two analysis of variance tables discussed earlier, there were thirteen factors, including sixty-two competency items, shown in Table 53 that achieved significant differences among the judgments of the three groups of instructors. However, forty-five of the sixty-two competency items attained significant differences among the three groups. Table 53 was established on the basis of the group means and the F values in the thirteen tables of multiple comparisons listed previously. In view of Table 53, the following observations were made:

1. The department heads judged the three factors listed below more important than did the instructors teaching predominantly undergraduate courses. The three factors were: (1) Public and Human Relations; (2) Communicating with Industry; and (3) Developing Curricula. For this comparison of each of the three factors between the two groups, the significance was at the .01 level. No significant difference was found as measured on each of the above three factors both between the instructors teaching predominantly undergraduate courses and those teaching predominantly graduate

courses, and between the latter group and the department heads.

2. The instructors teaching predominantly graduate courses judged the three factors listed below to be more important than did those teaching predominantly undergraduate courses. The three factors were: (1) Research Knowledge and Techniques; (2) Reading and Evaluating Research Reports; and (3) Using Research Findings and Implications. For this comparison, the first and the third factor were judged to be significantly different at the .05 level; and the second factor, at the .01 level between the two groups. No significant difference was found as measured on each of the above three factors both between the instructors teaching predominantly undergraduate courses and the department heads, and between the latter group and the instructors teaching predominantly graduate courses.

3. The instructors teaching predominantly graduate courses and the department heads judged the four factors listed below to be more important than did the instructors teaching predominantly undergraduate courses. The four factors were: (1) Writing Proposals for Research and Reports; (2) Leadership in Professional Organizations/ Conferences; (3) Development of New Knowledge and Programs; and (4) Understanding Federal and State Laws Pertaining to

Industrial Education. The first, third, and fourth factor were judged to be significantly different at the .01 level; and the second factor, at the .05 level between the instructors teaching predominantly undergraduate courses and those teaching predominantly graduate courses. Again, the first factor was judged to be significantly different at the .05 level; and the remaining three factors, at the .01 level between the instructors teaching predominantly undergraduate courses and the department heads. No significant difference was found as measured on each of the four factors between the instructors teaching predominantly graduate courses and the department heads.

4. Although there were significant differences among the judgments of the three groups of instructors concerning these two factors: (1) Membership in Professional Organizations; and (2) Assessing Student Performances, no significant difference was found as measured on each of the two factors between any two of the three groups. It was observed that Items 76 and 77 included in the first factor achieved significant differences between the instructors teaching predominantly undergraduate courses and those teaching predominantly graduate courses, and between the former group and the department heads, respectively. Also, Items 30 and 37 encompassed in the second factor reached significant

differences between the instructors teaching predominantly undergraduate courses and the department heads, and between the former group and the instructors teaching predominantly graduate courses, respectively.

5. The department heads judged the factor, Following Administrative Practices and Principles, to be more important than did both the instructors teaching predominantly undergraduate courses and those teaching predominantly graduate courses. This factor was judged to be significantly different at the .01 level between the first group and the second group, and between the first group and the third group. No significant difference was found between the second group and the third group.

## Summary

The three subheadings which have been discussed in this chapter are: (1) Reliability of the questionnaire factors; (2) Important professional education competencies; and (3) Testing the hypothesis.

The highest reliability of the questionnaire factors was .89 (Factor 4); the lowest reliability, .69 (Factor 19); and the reliability of the total factors was .96.

A list of ninety-eight important professional education competencies was established by using the judgments of the total respondents, the instructors teaching predominantly

Table 53. Thirteen factors judged containing significant differences among the three groups of instructors in this study

| Factor | Comparisons | | |
|---|---|---|---|
| | Undergraduate vs. Graduate | Undergraduate vs. Dept. Heads | Graduate vs. Dept. Heads |
| | Factor judged more important by: | | |
| Public and Human Relations | - | Dept. Heads** | - |
| Research Knowledge and Techniques | Graduate* | - | - |
| Writing Proposals for Research and Reports | Graduate** | Dept. Heads* | - |
| Leadership in Professional Organizations/Conferences | Graduate* | Dept. Heads** | - |
| Membership in Professional Organizations | - | - | - |
| Development of New Knowledge and Programs | Graduate** | Dept. Heads** | - |
| Reading and Evaluating Research Report | Graduate** | - | - |
| Assessing Student Performances | - | - | - |
| Understanding Federal and State Laws Pertaining to Industrial Education | Graduate** | Dept. Heads** | - |
| Following Administrative Practices and Principles | - | Dept. Heads** | Dept. Heads** |
| Communicating with Industry | - | Dept. Heads** | - |
| Developing Curricula | - | Dept. Heads** | - |
| Using Research Findings and Implications | Graduate* | - | - |

*$P \leq .05$.

**$P \leq .01$.

graduate courses, and the department heads, respectively. Also, a list of ninety-six important professional education competencies was established by using the judgments of the instructors teaching predominantly undergraduate courses. The two competency items which were not supported by 66% or higher of this group were: (1) Develop a program evaluation and review technique (PERT) network; and (2) Plan for and organize a youth group.

Nine factors did not contain significant differences among the three groups of instructors while thirteen factors did indicate significant differences among the three groups. Either the instructors teaching predominantly graduate courses or the department heads, or both judged the thirteen factors to be more important than did the instructors teaching predominantly undergraduate courses.

# CHAPTER V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Seven subheadings are discussed in this chapter. These subheadings include: (1) The problem; (2) The hypothesis; (3) Procedures; (4) Methods of analysis of the data; (5) Findings; (6) Conclusions; and (7) Recommendations for further study.

## The Problem

The problem of this study was two-fold.

1. To determine the important professional education competencies of doctoral degree recipients in industrial education who teach at four year colleges or universities.
2. To determine the extent of agreement of each of the twenty-two factors (pp. 115-122) encompassing selected professional education competencies identified in this study by instructors teaching predominantly undergraduate courses, those teaching predominantly graduate courses, and department heads who have received doctoral degrees in industrial education and who teach at four-year colleges or universities.

## The Hypothesis

The hypothesis formulated and tested in this study was as follows:

It was hypothesized that there would be no significant difference among the judgments of the three groups of instructors concerning each of the twenty-two factors encompassing selected professional education competencies identified in this study.

## Procedures

A mail survey questionnaire was developed to collect data. A review of related literature served as the basis for the initial identification of competencies to be included. A jury of experts evaluated the professional education competencies contained in the questionnaire. The revised questionnaire was then field tested to determine whether or not any revisions were needed. The final questionnaire contained ninety-eight professional education competencies. The questionnaire was designed to permit instructors to respond to the level of proficiency necessary for each competency in relation to their professional responsibilities. Their responses consisted of indicating whether none, slight, moderate, considerable, or complete mastery of a competency was needed. Responses

by participants were assigned Likert-type scale values of 1-5.

The population of this study consisted of 353 doctoral degree recipients in industrial education who teach at four-year colleges or universities. The sample chosen to represent this population included those individuals who had received their doctoral degrees in industrial education during the period from September 1, 1968 through August 31, 1973. These individuals graduated from the forty-one universities (Appendix A) identified in this study.

The information from each returned questionnaire was checked, coded, and punched on data processing cards for analysis at the Iowa State University Computation Center.

## Methods of Analysis of the Data

The questionnaire, including six subscales, contained ninety-eight competencies. By using the statistical technique of factor analysis to detect common traits of the ninety-eight competencies, twenty-two factors were identified through a factor pattern matrix. The original six subscales of the questionnaire were then amplified and converted to include twenty-two factors. In order to determine the appropriateness of the questionnaire for further statistical treatments, Spearman Brown average interitem reliability coefficients were computed on responses over all items and

twenty-one of the twenty-two factors. The last factor (22) was omitted since this factor included only one competency item.

The first problem of this study was solved and the first objective of this study achieved basically by using the following criterion: If 66% or higher of either the total respondents or the respondents of each of the three groups of instructors rated a certain competency item a value equal to 3 or larger than 3 (using a Likert scale of 1-5), the item was considered as an important professional education competency. The proficiency scale of one to five was converted to an importance scale.

The hypothesis formulated in this study was tested by using a One-way Classification Analysis of Variance treatment. The use of the analysis of variance was to test for mean differences among the three groups of instructors in this study. If there was a significant difference of the mean among the three groups of instructors when testing each of the twenty-two factors identified in this study at the .05 level of confidence, the Scheffé Method of Multiple Comparisons was employed to determine between which particular groups the difference occurred. Each competency item included in a factor to which the Scheffé method was applied was further tested to determine if there was a significant difference of the mean between any two of the three groups of instructors.

## Findings

The following specific observations present some of the more important findings identified from a detailed analysis of the ninety-eight professional education competencies identified in this study:

1. A list of ninety-eight important professional education competencies was established by using the judgments of the total respondents, the instructors teaching predominantly graduate courses, and the department heads, respectively. Also, a list of ninety-six important professional education competencies was established by using the judgments of the instructors teaching predominantly undergraduate courses. The two competency items which were not supported by the required minimum of 66% of this group were: (1) Develop a program evaluation and review technique (PERT) network; and (2) Plan for and organize a youth group.
2. The thirteen competencies consistently rated "most important" by the respondents of each of the three groups of instructors in this study were:
   a. Recognize student needs and/or goals
   b. Demonstrate a high level of knowledge of subject matter

c. Keep course(s) of study and instructional materials up to date

d. Establish evaluative criteria for a course

e. Specify instructional objectives based upon the needs of students

f. Demonstrate a humanistic approach to instruction

g. Stimulate and maintain students' interest throughout the instructional process

h. Write in a clear, concise manner acceptable to graduate-level standards

i. Analyze and organize subject matter into instructional units

j. Work effectively with department heads and/or other administrative personnel

k. Communicate ideas or points of view to other instructors or administrators

l. Listen to colleagues and/or students

m. Demonstrate practice consistent with stated beliefs

3. There were nine factors, including thirty-six competency items, that showed no significant differences at the .10 level among the judgments of the three groups of instructors. The nine factors were:

a. Testing and Measurement;

b. Instructional Strategies;

c. Understanding Current Trends and Role of Industrial Education;

d. Relating Technological Advances and Current Events to Classroom Instruction;

e. Constructing Performance-Based Objectives;

f. Demonstrating a High Level of Knowledge and Technical Performance in Certain Area(s) of Specialization;

g. Understanding the Meaning, Philosophy, and History of Industrial Education;

h. Diagnosing and Prescribing Instruction Based upon Student Needs and Abilities; and

i. Phasing out Nonfunctional Units.

4. There were thirteen factors, including sixty-two competency items, that achieved significant differences among the judgments of the three groups of instructors. However, forty-five of the sixty-two competency items attained significant differences among the three groups. The extent of differences with regard to the importance of the thirteen factors among the judgments of the three groups were as follows:

   a. The department heads judged the three factors listed below to be more important than did the instructors teaching predominantly undergraduate courses. The three factors were: (1) Public and Human Relations; (2) Communicating with Industry; and (3) Developing Curricula. No significant difference was found as measured on each of the above three factors both between the instructors teaching predominantly undergraduate courses and those teaching predominantly graduate courses, and between the latter group and the department heads.

b. The instructors teaching predominantly graduate courses judged the three factors listed below to be more important than did those teaching predominantly undergraduate courses. The three factors were: (1) Research Knowledge and Techniques; (2) Reading and Evaluating Research Reports; and (3) Using Research Findings and Implications. No significant difference was found as measured on each of the above three factors both between the instructors teaching predominantly undergraduate courses and the department heads, and between the latter group and the instructors teaching predominantly graduate courses.

c. The instructors teaching predominantly graduate courses and the department heads judged the four factors listed below to be more important than did the instructors teaching predominantly undergraduate courses. The four factors were: (1) Writing Proposals for Research and Reports; (2) Leadership in Professional Organizations/Conferences; (3) Development of new Knowledge and Programs; and (4) Understanding Federal and State Laws Pertaining to Industrial Education. No significant difference was found as measured on each of the four factors between the instructors teaching predominantly graduate courses and the department heads.

d. Although there were significant differences among the judgments of the three groups of instructors concerning these two factors: (1) Membership in Professional Organizations; and (2) Assessing Student Performances, no significant difference was found as measured on each of the two factors between any two of the three groups. It was observed that Items 76 and 77 included in the first factor achieved significant differences between the instructors teaching predominantly undergraduate courses and those teaching predominantly graduate courses, and between the former group and the department heads, respectively. Also, Items 30 and 37 encompassed in the second factor reached significant differences between the instructors teaching predominantly undergraduate courses and the department heads, and between the former group and the instructors teaching predominantly graduate courses, respectively.

e. The department heads judged the factor, Following Administrative Practices and Principles, to be more important than did both the instructors teaching predominantly undergraduate courses and those teaching predominantly graduate courses. No significant difference was found between the second group and the third group.

## Conclusions

Based upon the findings of this study and the review of the related literature, the following conclusions were drawn:

1. The mail survey questionnaire containing ninety-eight professional education competencies with a five-point Likert-type scale was a satisfactory method of securing data for the study.

2. A very high degree of agreement exists among the three groups of instructors concerning the list of important professional education competencies needed by doctoral students in industrial education who are preparing to teach at four-year colleges or universities. This degree of agreement was reflected by both the instructors teaching predominantly graduate courses and the department heads who judged ninety-eight competencies all important while the instructors teaching predominantly undergraduate courses judged only ninety-six of the ninety-eight competencies important.

3. There were thirteen competencies consistently rated "most important" by the respondents of each of the three groups of instructors. Thus, doctoral programs in industrial

education should place emphasis on the development of these thirteen competencies for the doctoral students who want to teach at the higher learning institutions after graduation.

4. Nine factors were judged not containing significant differences among the judgments of the three groups. So, the nine factors and the competency items contained therein should be equally stressed for the preparation of the future instructors for industrial education at four-year colleges or universities.

5. Thirteen factors did indicate significant differences among the judgments of the three groups. Either the instructors teaching predominantly graduate courses or the department heads, or both judged the thirteen factors to be more important than did the instructors teaching predominantly undergraduate courses. Based upon the findings of this study, it can be concluded that advanced degree programs in industrial education should emphasize that it is more important to develop the competencies within these thirteen factors for the doctoral students who want to be the instructors of predominantly graduate courses or the department heads.

6. The results of testing the hypothesis indicated that factor analysis was appropriate for developing groupings of professional education competencies that could be used as a basis for advanced degree curricula development in industrial

education for the purpose of training the three groups of instructors included in the study.

7. The literature reveals that teacher education institutions should stress a competency-based curriculum when designing or developing curricula for the professional preparation of industrial education teacher educators.

## Recommendations for Further Study

As a result of the findings and conclusions of this investigation, and, in order to extend the benefits of this study, the following recommendations were made for further study:

1. The possibility of both the instructors' judgments on professional education competencies and the factor structures changing over time needs to be recognized. Thus, the present study should be replicated five years hence to verify the reliability of the findings.

2. It is recommended that a similar study be conducted using both the list of identified professional education competencies and the suggested additional competencies provided by the respondents (Appendix L) with the three groups of instructors identified in this study as the respondents.

3. The limited amount of literature in the area of professional education competencies needed by Master's degree recipients in industrial education who teach at four-year

colleges or universities indicates a need for additional professional education competency studies for this level of professional preparation.

4. Similar studies should be conducted which identify the specific competencies needed to adequately perform in the various technical areas of industrial education.

5. A study concerned with the feasibility of developing competency tests based upon professional education competencies should be conducted.

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## ACKNOWLEDGMENTS

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The writer is particularly indebted to Dr. John W. Menne for his special guidance and help with the statistical analysis and treatment of the data employed in the study.

This researcher wishes to thank all the professors at Iowa State University who contributed to his preparation and readiness to conduct this research.

Most importantly, the writer feels especially indebted to his wife, Ho Pe, for her patience, encouragement, understanding, typing, and proofreading throughout this research effort.

# APPENDIX A: UNIVERSITIES PARTICIPATING IN THE STUDY

Universities Participating in the Study

1. Arizona State University
2. Arkansas, University of
3. Auburn University
4. Bowling Green State University
5. Brigham Young University
6. California, University of - Los Angeles
7. Cincinnati, University of
8. Connecticut, University of
9. East Texas State University
10. Florida, University of
11. Houston, University of
12. Illinois, University of
13. Indiana University
14. Iowa State University
15. Kent State University
16. Kentucky, University of
17. Maryland, University of
18. Michigan State University
19. Michigan, The University of
20. Minnesota, University of
21. Mississippi State University
22. Missouri, University of
23. New York, State University of - Buffalo

24. New York University Washington Square
25. North Carolina State University
26. North Texas State University
27. Northern Colorado, University of
28. Oregon State University
29. Purdue University
30. Rutgers University-The State University of New Jersey
31. Southern Illinois University
32. Temple University
33. Texas A&M University
34. The Ohio State University
35. The Pennsylvania State University
36. Utah State University
37. Washington State University
38. Washington, University of
39. Wayne State University
40. West Virginia University
41. Wyoming, University of

# APPENDIX B: LETTER SENT TO JURY OF EXPERTS

July 12, 1974

Dear Dr.

As a part of my doctoral degree program at Iowa State University, I am conducting research to determine professional education competencies of doctoral degree recipients in industrial education who teach at four-year colleges or universities. The results of this study should be valuable to those involved in evaluation, revision, and/or development of industrial education doctoral degree curricula.

To accomplish this task I would appreciate that you serve on a jury made up of five recognized competency-based teacher educators to evaluate the attached list of professional education competencies. Your help in providing suggestions to the list of professional education competencies could make a significant impact upon doctoral degree curricula in industrial education.

Attached are: (1) a list of professional education competencies of doctoral degree recipients in industrial education who teach at four-year colleges or universities; and (2) a Jury of Experts Revision Form. After reading the list of competency items, please provide your suggestions on the Revision Form and return it to me by using the self-addressed envelope enclosed within the next ten days. If enough space is not provided on the Revision Form, please use the reverse side of each page.

Your time and effort will be greatly appreciated.

Sincerely yours,

Yuan H. Liu

Yuan H. Liu

# APPENDIX C: JURY OF FIVE COMPETENCY-BASED TEACHER EDUCATORS

Jury of Five Competency-Based Teacher Educators

1. Dr. Andrew F. Ford
   Dean of Occupational Education
   Washtenau Community College
   Ann Arbor, Michigan 48106

2. Dr. F. Milton Miller
   Department of Practical Arts and
   Vocational-Technical Education
   College of Education
   University of Missouri
   Columbia, Missouri 65201

3. Dr. James A. Miller, Head
   Department of Industrial Education
   School of Business and Technology
   Kearney State College
   Kearney, Nebraska 68847

4. Dr. G. Harold Silvius, Coordinator
   Department of Vocational and Applied Arts Education
   College of Education
   Wayne State University
   Detroit, Michigan 48202

5. Dr. William D. Wolansky, Chairman
   Industrial Education Department
   College of Education
   Iowa State University
   Ames, Iowa 50010

# APPENDIX D: JURY OF EXPERTS REVISION FORM

Jury of Experts Revision Form

From_____ Position_____

Institution_____

Subject: Suggested Revisions to the List of Professional Education Competencies

| Item No. | Suggested Revisions |
| --- | --- |

Item No. Suggested Revisions (Continued)

## Suggested Additions
(New items)

## Suggested Deletions

Item No.

# APPENDIX E: QUESTIONNAIRE

# Industrial Education Instructor Questionnaire

Purpose of this questionnaire:

The purpose of this questionnaire is to obtain information from doctoral degree recipients in Industrial Education concerning important professional education competencies. This information should be valuable to those involved in evaluation and development of industrial education doctoral degree curricula.

"Industrial Education" is defined as:

> Various types of education of an industrial nature, such as vocational industrial education, industrial arts, and technical education.

The "professional education competencies" are defined as:

> The knowledge, abilities, understanding, and expected behaviors in areas other than technical fields which enable industrial education instructors at four-year colleges or universities to be successful in their teaching endeavors and related activities, and to advance in their teaching positions.

## I. Professional Background

Note: Your name is an aid to follow-up procedure.

1. Name_____
   (First) (Middle Initial) (Last)

2. Do you teach any course(s) in industrial education at the four-year college/university level?
   ___Yes ___No
   If your answer to this item is no, please disregard this questionnaire and return it to the investigator.

3. Do you teach predominantly undergraduate course(s) or graduate course(s)?
   ___Undergraduate course(s) ___Graduate Course(s)

4. Are you a department head/chairman of industrial education, or in charge of industrial education?
   ___Yes ___No

II. Instructions for Completion of the Questionnaire

1. This questionnaire lists professional education competencies for industrial education instructors at four-year colleges/universities. You are being asked to indicate the level of proficiency you feel is necessary for each competency in relation to your job.

2. For each item please circle the rating (1, 2, 3, 4, 5) which most closely represents your feeling. If your exact opinion is not found in one of the choices, pick the one which comes closest to your true feeling.

   Here is an example:
   What proficiency must you have in your work as an industrial education instructor regarding your ability to

   (1) Develop objective tests to measure achievement?

   None Slight Moderate Considerable Complete
   1 2 3 4 (5)

   This person, in marking the "5" rating, felt that his job required complete proficiency with regard to this task.

3. Please do not leave out any item -- there are no right or wrong answers. Do not take too much time in thinking about any particular item.

Professional Education Competencies Questionnaire

What proficiency must you have in your work as an industrial education instructor regarding your ability to

| | None | Slight | Moderate | Considerable | Complete |
|---|---|---|---|---|---|
| A. Planning for Instruction | | | | | |
| 1. Formulate and defend a consistent philosophy of industrial education? | 1 | 2 | 3 | 4 | 5 |
| 2. Recognize student needs and/or goals? | 1 | 2 | 3 | 4 | 5 |
| 3. Plan instruction to accommodate diverse student groups? | 1 | 2 | 3 | 4 | 5 |
| 4. Demonstrate a high level of knowledge of subject matter? | 1 | 2 | 3 | 4 | 5 |
| 5. Demonstrate a high level of technical performance in certain area(s) of specialization? | 1 | 2 | 3 | 4 | 5 |
| 6. Understand all components of vocational education including agricultural education, business and office education, distributive education, health occupations, home economics, and trade and industrial education? | 1 | 2 | 3 | 4 | 5 |
| 7. Make the distinction between the terms "industrial education", "industrial arts", and "vocational education" in meaning, scope, and activities? | 1 | 2 | 3 | 4 | 5 |
| 8. Understand the meaning of the word "technology"? | 1 | 2 | 3 | 4 | 5 |
| 9. Select components of the instructional program from the multitude of existing curriculum materials? | 1 | 2 | 3 | 4 | 5 |
| 10. Keep course(s) of study and instructional materials up to date? | 1 | 2 | 3 | 4 | 5 |
| 11. Use the information contained in professional journals and literature in industrial education? | 1 | 2 | 3 | 4 | 5 |
| 12. Use research findings regarding effectiveness of teaching methodology? | 1 | 2 | 3 | 4 | 5 |
| 13. Understand the history of industrial education? | 1 | 2 | 3 | 4 | 5 |

| | None | Slight | Moderate | Considerable | Complete |
|---|---|---|---|---|---|
| 14. Establish evaluative criteria for a course? | 1 | 2 | 3 | 4 | 5 |
| B. Implementing Instruction | | | | | |
| 15. Specify instructional objectives based upon the needs of students? | 1 | 2 | 3 | 4 | 5 |
| 16. Demonstrate a humanistic approach to instruction? | 1 | 2 | 3 | 4 | 5 |
| 17. Diagnose and prescribe instruction based upon individual needs and abilities? | 1 | 2 | 3 | 4 | 5 |
| 18. Use methods to meet special needs of handicapped students? | 1 | 2 | 3 | 4 | 5 |
| 19. Use texts, reference material, and special teaching aids? | 1 | 2 | 3 | 4 | 5 |
| 20. Develop audio-visual material for instructional purposes? | 1 | 2 | 3 | 4 | 5 |
| 21. Use the micro-teaching method? | 1 | 2 | 3 | 4 | 5 |
| 22. Use audio-tutorial instruction? | 1 | 2 | 3 | 4 | 5 |
| 23. Develop and use programmed instruction? | 1 | 2 | 3 | 4 | 5 |
| 24. Use televised instruction in the laboratory/classroom? | 1 | 2 | 3 | 4 | 5 |
| 25. Relate technological advances to laboratory and classroom instruction? | 1 | 2 | 3 | 4 | 5 |
| 26. Relate current events associated with the area of specialization to classroom instruction? | 1 | 2 | 3 | 4 | 5 |
| 27. Stimulate and maintain students' interest throughout the instructional process? | 1 | 2 | 3 | 4 | 5 |
| 28. Supervise or manage student activities in the laboratory/classroom? | 1 | 2 | 3 | 4 | 5 |
| 29. Perform guidance activities on an informal and/or formal basis? | 1 | 2 | 3 | 4 | 5 |

| | None | Slight | Moderate | Considerable | Complete |
|---|---|---|---|---|---|
| 30. Supervise and direct students' practice teaching? | 1 | 2 | 3 | 4 | 5 |
| 31. Conduct in-service short-term workshops for teachers and industrial personnel? | 1 | 2 | 3 | 4 | 5 |
| C. Evaluating Instruction | | | | | |
| 32. Understand basic principles of educational testing and measurement? | 1 | 2 | 3 | 4 | 5 |
| 33. Select and use appropriate standardized tests to measure achievement | 1 | 2 | 3 | 4 | 5 |
| 34. Construct and use performance-based criterion-referenced evaluation instruments? | 1 | 2 | 3 | 4 | 5 |
| 35. Assess student cognitive performance? | 1 | 2 | 3 | 4 | 5 |
| 36. Assess student psychomotor performance? | 1 | 2 | 3 | 4 | 5 |
| 37. Assess student affective performance? | 1 | 2 | 3 | 4 | 5 |
| 38. Construct and use achievement tests? | 1 | 2 | 3 | 4 | 5 |
| 39. Assess the validity of teacher-made tests? | 1 | 2 | 3 | 4 | 5 |
| 40. Assess the reliability of teacher-made tests? | 1 | 2 | 3 | 4 | 5 |
| 41. Interpret and use students' evaluation of instruction? | 1 | 2 | 3 | 4 | 5 |
| 42. Use the findings of follow-up studies for determining effectiveness of instruction? | 1 | 2 | 3 | 4 | 5 |
| D. Conducting Research | | | | | |
| 43. Understand statistical techniques used for conducting research? | 1 | 2 | 3 | 4 | 5 |
| 44. Conduct research using a variety of appropriate research skills and controls? | 1 | 2 | 3 | 4 | 5 |

| | | None | Slight | Moderate | Considerable | Complete |
|---|---|---|---|---|---|---|
| 45. | Utilize the computer to analyze and summarize data collected? | 1 | 2 | 3 | 4 | 5 |
| 46. | Make effective use of research and curriculum retrieval systems such as ERIC? | 1 | 2 | 3 | 4 | 5 |
| 47. | Read and evaluate literature relative to research? | 1 | 2 | 3 | 4 | 5 |
| 48. | Keep abreast of current research projects? | 1 | 2 | 3 | 4 | 5 |
| 49. | Identify research problems for study? | 1 | 2 | 3 | 4 | 5 |
| 50. | Write proposals for research and/or pilot projects? | 1 | 2 | 3 | 4 | 5 |
| 51. | Conduct and encourage laboratory/classroom research? | 1 | 2 | 3 | 4 | 5 |
| 52. | Interpret and utilize research findings and implications for existing industrial education programs? | 1 | 2 | 3 | 4 | 5 |
| 53. | Interpret the findings of studies which have a bearing on the educational, psychological, and social problems of industrial education students? | 1 | 2 | 3 | 4 | 5 |
| 54. | Demonstrate competence to assist graduate students in writing thesis proposals and conducting research? | 1 | 2 | 3 | 4 | 5 |
| 55. | Write in a clear, concise manner acceptable to graduate-level standards? | 1 | 2 | 3 | 4 | 5 |
| 56. | Write abstracts for research reports? | 1 | 2 | 3 | 4 | 5 |
| 57. | Publish papers and/or research reports? | 1 | 2 | 3 | 4 | 5 |
| 58. | Develop a program evaluation and review technique (PERT) network? | 1 | 2 | 3 | 4 | 5 |

| | None | Slight | Moderate | Considerable | Complete |
|---|---|---|---|---|---|
| **E. Developing Curricula** | | | | | |
| 59. Develop new curricula and programs based upon suggestions provided by advisory committees and/or practicing teachers? | 1 | 2 | 3 | 4 | 5 |
| 60. Make use of manpower data to develop curricula | 1 | 2 | 3 | 4 | 5 |
| 61. Make use of program evaluation to develop curricula? | 1 | 2 | 3 | 4 | 5 |
| 62. Develop interdisciplinary and multidisciplinary curricula? | 1 | 2 | 3 | 4 | 5 |
| 63. Understand social, economic, and technological changes and their implications for industrial education curriculum development? | 1 | 2 | 3 | 4 | 5 |
| 64. Combine jobs, operations, and related information into a course of study? | 1 | 2 | 3 | 4 | 5 |
| 65. Organize and develop a curriculum around useful and meaningful units of experience that relate the instructional program to industrial practices? | 1 | 2 | 3 | 4 | 5 |
| 66. Construct an instructional program consistent with performance-based objectives? | 1 | 2 | 3 | 4 | 5 |
| 67. Analyze and organize subject matter into instructional units? | 1 | 2 | 3 | 4 | 5 |
| 68. Phase out nonfunctional units? | 1 | 2 | 3 | 4 | 5 |
| 69. Design and implement an adult education course or program? | 1 | 2 | 3 | 4 | 5 |
| **F. Miscellaneous** | | | | | |
| 70. Understand the role of industrial education as it relates to career education? | 1 | 2 | 3 | 4 | 5 |

| | | None | Slight | Moderate | Considerable | Complete |
|---|---|---|---|---|---|---|
| 71. | Understand current trends in industrial education? | 1 | 2 | 3 | 4 | 5 |
| 72. | Demonstrate knowledge of current trends and concepts affecting industrial education? | 1 | 2 | 3 | 4 | 5 |
| 73. | Assist in the development of new professional knowledge and information? | 1 | 2 | 3 | 4 | 5 |
| 74. | Locate the sources and variety of information needed to meet professional responsibilities? | 1 | 2 | 3 | 4 | 5 |
| 75. | Keep abreast of professional developments? | 1 | 2 | 3 | 4 | 5 |
| 76. | Function as a member of a committee? | 1 | 2 | 3 | 4 | 5 |
| 77. | Demonstrate awareness of the purpose and programs of professional associations by membership in those organizations? | 1 | 2 | 3 | 4 | 5 |
| 78. | Understand the responsibilities of a member of professional organizations? | 1 | 2 | 3 | 4 | 5 |
| 79. | Prepare and submit reports for national/state professional conferences? | 1 | 2 | 3 | 4 | 5 |
| 80. | Demonstrate leadership in professional organizations? | 1 | 2 | 3 | 4 | 5 |
| 81. | Plan for and organize a youth group? | 1 | 2 | 3 | 4 | 5 |
| 82. | Lead a conference and/or a meeting? | 1 | 2 | 3 | 4 | 5 |
| 83. | Work effectively with department heads and/or other administrative personnel? | 1 | 2 | 3 | 4 | 5 |
| 84. | Communicate ideas or points of view to other instructors or administrators? | 1 | 2 | 3 | 4 | 5 |
| 85. | Listen to colleagues and/or students? | 1 | 2 | 3 | 4 | 5 |

| | | None | Slight | Moderate | Considerable | Complete |
|---|---|---|---|---|---|---|
| 86. | Communicate with a public audience? | 1 | 2 | 3 | 4 | 5 |
| 87. | Demonstrate organizational skills? | 1 | 2 | 3 | 4 | 5 |
| 88. | Demonstrate practice consistent with stated beliefs? | 1 | 2 | 3 | 4 | 5 |
| 89. | Understand federal and state laws pertaining to industrial education? | 1 | 2 | 3 | 4 | 5 |
| 90. | Understand state certification requirements for industrial education teachers? | 1 | 2 | 3 | 4 | 5 |
| 91. | Relate to community organizations? | 1 | 2 | 3 | 4 | 5 |
| 92. | Communicate with industry? | 1 | 2 | 3 | 4 | 5 |
| 93. | Establish and maintain advisory committees? | 1 | 2 | 3 | 4 | 5 |
| 94. | Establish and support internships in industry and business? | 1 | 2 | 3 | 4 | 5 |
| 95. | Follow administrative practices, and principles? | 1 | 2 | 3 | 4 | 5 |
| 96. | Prepare budgets for operating a Department of Industrial Education? | 1 | 2 | 3 | 4 | 5 |
| 97. | Plan physical facilities for industrial arts, and vocational education? | 1 | 2 | 3 | 4 | 5 |
| 98. | Evaluate instructional staff? | 1 | 2 | 3 | 4 | 5 |

In the space below please add additional competencies you consider important for your job success and circle the level of proficiency necessary for the industrial education instructors.

| | None | Slight | Moderate | Considerable | Complete |
|---|---|---|---|---|---|
| 99. | 1 | 2 | 3 | 4 | 5 |
| 100. | 1 | 2 | 3 | 4 | 5 |
| 101. | 1 | 2 | 3 | 4 | 5 |

On the remainder of this sheet, please feel free to make comments and suggestions for professional education competencies.

Thank you for your time and cooperation!

PLEASE RETURN THIS QUESTIONNAIRE AS SOON AS POSSIBLE

# APPENDIX F: PROFESSIONAL EDUCATION COMPETENCIES LISTED UNDER THE SIX IDENTIFIED SUBSCALES

Professional Education Competencies Listed under the Six Identified Subscales

1. Planning for Instruction

Knowledge of and ability to:

--Formulate and defend a consistent philosophy of industrial education.

--Recognize student needs and/or goals.

--Plan instruction to accommodate diverse student groups.

--Demonstrate a high level of knowledge of subject matter.

--Demonstrate a high level of technical performance in certain area(s) of specialization.

--Understand all components of vocational education including agricultural education, business and office education, distributive education, health occupations, home economics, and trade and industrial education.

--Make the distinction between the terms "industrial education", "industrial arts" and "vocational education" in meaning, scope, and activities.

--Understand the meaning of the word "technology".

--Select components of the instructional program from the multitude of existing curriculum materials.

--Keep course(s) of study and instructional materials up to date.

--Use the information contained in professional journals and literature in industrial education.

--Use research findings regarding effectiveness of teaching methodology.

--Understand the history of industrial education.

--Establish evaluative criteria for a course.

2. Implementing Instruction

Knowledge of and ability to:

--Specify instructional objectives based upon the needs of students.

--Demonstrate a humanistic approach to instruction.

--Diagnose and prescribe instruction based upon individual needs and abilities.

--Use methods to meet special needs of handicapped students.

--Use texts, reference material, and special teaching aids.

--Develop audio-visual material for instructional purposes.

--Use the micro-teaching method.

--Use audio-tutorial instruction.

--Develop and use programmed instruction.

--Use televised instruction in the laboratory/classroom.

--Relate technological advances to laboratory and classroom instruction.

--Relate current events associated with the area of specialization to classroom instruction.

--Stimulate and maintain students' interest throughout the instructional process.

--Supervise or manage student activities in the laboratory/classroom.

--Perform guidance activities on an informal and/or formal basis.

--Supervise and direct students' practice teaching.

--Conduct in-service short-term workshops for teachers and industrial personnel.

3. Evaluating Instruction

Knowledge of and ability to:

--Understand basic principles of educational testing and measurement.

--Select and use appropriate standardized tests to measure achievement.

--Construct and use performance-based criterion-referenced evaluation instruments.

--Assess student cognitive performance.

--Assess student psychomotor performance.

--Assess student affective performance.

--Construct and use achievement tests.

--Assess the validity of teacher-made tests.

--Assess the reliability of teacher-made tests.

--Interpret and use students' evaluation of instruction.

--Use the findings of follow-up studies for determining effectiveness of instruction.

4. Conducting Research

Knowledge of and ability to:

--Understand statistical techniques used for conducting research.

--Conduct research using a variety of appropriate research skills and controls.

--Utilize the computer to analyze and summarize data collected.

--Make effective use of research and curriculum retrieval systems such as ERIC.

--Read and evaluate literature relative to research.

--Keep abreast of current research projects.

--Identify research problems for study.

--Write proposals for research and/or pilot projects.

--Conduct and encourage laboratory/classroom research.

--Interpret and utilize research findings and implications for existing industrial education programs.

--Interpret the findings of studies which have a bearing on the educational, psychological, and social problems of industrial education students.

--Demonstrate competence to assist graduate students in writing thesis proposals and conducting research.

--Write in a clear, concise manner acceptable to graduate-level standards.

--Write abstracts for research reports.

--Publish papers and/or research reports.

--Develop a program evaluation and review of technique (PERT) network.

5. Developing Curricula

Knowledge of and ability to:

--Develop new curricula and programs based upon suggestions provided by advisory committees and/or practicing teachers.

--Make use of manpower data to develop curricula.

--Make use of program evaluation to develop curricula.

--Develop interdisciplinary and multidisciplinary curricula.

--Understand social, economic, and technological changes and their implications for industrial education curriculum development.

--Combine jobs, operations, and related information into a course of study.

--Organize and develop a curriculum around useful and meaningful units of experience that relate the instructional program to industrial practices.

--Construct an instructional program consistent with performance-based objectives.

--Analyze and organize subject matter into instructional units.

--Phase out nonfunctional units.

--Design and implement an adult education course or program.

6. Miscellaneous

Knowledge of and ability to:

--Understand the role of industrial education as it relates to career education.

--Understand current trends in industrial education.

--Demonstrate knowledge of current trends and concepts affecting industrial education.

--Assist in the development of new professional knowledge and information.

--Locate the sources and variety of information needed to meet professional responsibilities.

--Keep abreast of professional developments.

--Function as a member of a committee.

--Demonstrate awareness of the purpose and programs of professional associations by membership in thos organizations.

--Understand the responsibilities of a member of professional organizations.

--Prepare and submit reports for national/state professional conferences.

--Demonstrate leadership in professional organizations.

--Plan for and organize a youth group.

--Lead a conference and/or a meeting.

--Work effectively with department heads and/or other administrative personnel.

--Communicate ideas or points of view to other instructors or administrators.

--Listen to colleagues and/or students.

--Communicate with a public audience.

--Demonstrate organizational skills.

--Demonstrate practice consistent with stated beliefs.

--Understand federal and state laws pertaining to industrial education.

--Understand state certification requirements for industrial education teachers.

--Relate to community organizations.

--Communicate with industry.

--Establish and maintain advisory committees.

--Establish and support internships in industry and business.

--Follow administrative practices, and principles.

--Prepare budgets for operating a Department of Industrial Education.

--Plan physical facilities for industrial arts, and vocational education.

--Evaluate instructional staff.

# APPENDIX G: LETTER SENT TO INDUSTRIAL EDUCATION DEPARTMENT HEADS

July 5, 1974

Dear Dr.

As a part of my doctoral degree program at Iowa State University, I am conducting research to determine professional education competencies of doctoral degree recipients in industrial education who teach at four-year colleges or universities. The results of this study should be valuable to those involved in evaluation, revision, and/or development of industrial education doctoral degree curricula.

To accomplish this task I request your assistance by providing me with the following information:

1. The names and addresses of doctoral graduates in industrial education from your department for the period September 1, 1967 up to present.

2. The quarters/semesters, if available, and years the graduates earned their doctoral degrees.

Thank you for your assistance in this aspect of our professional growth. Your prompt attention to this matter will be greatly appreciated.

Sincerely yours,

Yuan H. Liu

Yuan H. Liu
Candidate of Doctorate
in Industrial Education
Iowa State University

# APPENDIX H: LETTER ACCOMPANYING INITIAL QUESTIONNAIRE MAILING

October 18, 1974

Dear Dr.

As a part of my doctoral degree program at Iowa State University, I am undertaking a nationwide study to determine the important professional education competencies needed for doctoral degree recipients in industrial education who teach at four-year colleges or universities. The enclosed questionnaire is designed to gather the opinions of selected doctoral graduates from industrial education programs as to what are the important professional education competencies. The results of this study should be valuable to those involved in evaluation and development of industrial education doctoral degree curricula.

You have been chosen as one of the respondents. This is your opportunity to express an opinion that may help the industrial education profession. Would you please help by completing the enclosed questionnaire.

You are requested to complete the Professional Background information section. You are then to mark the level of proficiency you feel is necessary for each competency in relation to your job.

It is important that you take a few minutes necessary to complete this questionnaire. Without your opinion, the profession might lose the one idea that could improve our profession.

There will be no attempt to identify or compare individuals or institutions.

A stamped, self-addressed envelope is enclosed for your convenience in returning the completed questionnaire.

May I express my thanks and appreciation in advance for your cooperation.

Approved by:

William Wolansky

Dr. William D. Wolansky, Chairman
Industrial Education Department
Iowa State University
Ames, Iowa

Sincerely yours,

Yuan H. Liu

Yuan H. Liu

# APPENDIX I: FIRST FOLLOW-UP LETTER FOR INITIAL QUESTIONNAIRE MAILING

November 3, 1974

Dear Dr.

Approximately two weeks ago, I sent you a questionnaire requesting your help in evaluating a list of professional education competencies needed for doctoral degree recipients in industrial education who teach at four-year colleges or universities. Hopefully, the data you provide will be very useful in the evaluation, development, or revision of industrial education doctoral degree curricula. If you have already completed and returned the questionnaire, please consider this memorandum as an expression of my appreciation.

If you have not responded, please do so within the next few days by using a stamped, self-addressed envelope sent to you earlier and return the completed questionnaire. Your cooperation is essential if this research study is to be completed successfully.

Approved by:

William D. Wolansky

Dr. William D. Wolansky, Chairman
Industrial Education Department
Iowa State University
Ames, Iowa

Sincerely yours,

Yuan H. Liu

Yuan H. Liu

# APPENDIX J: SECOND FOLLOW-UP LETTER ACCOMPANYING THE QUESTIONNAIRE

November 23, 1974

Dear Dr.

The returns from the selected doctoral degree recipients in industrial education concerning what are the important professional education competencies have been very encouraging. If you have returned the questionnaire, I wish to express my "thanks" to you for your cooperation,

Often times, things we plan to do later get misplaced. Enclosed you will find another copy of the questionnaire with a stamped, self-addressed envelope. From your experience of working with your doctoral dissertation, you realize the importance of receiving complete data.

This questionnaire requires only a few minutes of your time and your opinion is important. Won't you please complete the questionnaire and return it today.

Sincerely yours,

Yuan H. Liu

Yuan H. Liu

# APPENDIX K: THIRD FOLLOW-UP LETTER

December 8, 1974

Dear Dr.

On November 23, 1974, I sent you a questionnaire dealing with important professional education competencies needed by doctoral graduates in industrial education who teach at four-year colleges or universities. The results of this research study should be valuable to those involved in evaluation, revision, or development of industrial education doctoral degree curricula. As of this date, your completed questionnaire has not been received.

If you have not completed and returned the questionnaire, I hope you will find time from your busy schedule to do so. Your opinion is important to the profession, and it will only take a few minutes of your time to complete the questionnaire. If it is already in the mail, may I thank you and express my appreciation for your helpfulness.

Sincerely,

Yuan H. Liu

Yuan H. Liu

# APPENDIX L: SUGGESTED ADDITIONAL PROFESSIONAL EDUCATION COMPETENCIES PROVIDED BY THE RESPONDENTS

A List of 149 Suggested Additional Professional Education Competencies Provided by the Respondents (The Competencies are Grouped in Twenty-three Identified Areas)

1. Testing and Measurement

1. Administer written and performance trade competency examinations.

2. Be fair in testing.

2. Public and Human Relations

3. Work with faculty throughout the university.

4. Sooth the pique of college and university professors.

5. Be able to work and service with all levels of people.

6. Demonstrate skill in employing effective interpersonal communications with students, colleagues, and administrators.

7. Educate other instructors or administrators not necessarily related to your field.

8. Relate to and get along with fellow staff members.

9. Establish a rapport with a variety of people.

10. Interact professionally and socially with faculty from other departments and colleges.

11. Motivate staff in educational attainment and professional relations.

12. Maintain a professional relationship with professions outside of your discipline.

13. Get along with others.

14. Work with differentiated staff.

15. Be able to relate well with all types of people.

16. Demonstrate those personal characteristics possessed by most successful teachers, such as friendship and interest in students.

17. Develop a good working relation with peers and administrators.

18. Concern for students exhibited beyond the call of duty in the morning, at noon, or at night.

19. Aid in placing graduates.

20. Develop a recruitment tool that can be utilized on visitations to secondary schools or vocational technical schools.

21. Respect the right of junior staff members.

22. Develop both public relations and advertisement possibilities.

23. Develop and maintain positive staff relationships.

24. Protect junior staff from exploitation by senior staff.

25. Deal with other faculty members having different philosophies.

26. Communicate with people.

3. Research Knowledge and Techniques

27. Reserve a specific time for those candidates in the writing stages, i.e., writing theses or dissertations.

28. Aid doctoral students with research.

29. Be able to apply the various types of statistical designs to researchable situations.

4. Writing Proposals for Research and Reports

30. Be able to write a proposal for funding.

31. Identify and obtain support for research and development projects.

32. Publish in recognized journals.

33. Conduct follow-up studies of graduates.

34. Be able to write an article for a research journal.

5. Leadership in Professional Organizations/Conferences

35. Provide leadership in small group settings.

6. Instructional Strategies

36. Get to know your students and regard each of them as a person.

37. Provide a stimulating and facilitating environment in the classroom.

38. Select proper methods to reach stated objectives.

39. Develop teacher made software/overhead slides.

40. Prepare present students better in technical areas than has been done in the past.

41. Conduct interesting discussions with student.

42. Be able to implement systems approaches for learning and learning to learn.

43. Develop computer based resource units.

44. Be able to discipline and control class.

45. Organize activities to stimulate learning.

46. Inject humor, showmanship, and psychology into teaching material in appropriate ways.

47. Be able to correlate classroom situations to the type of psychology experiences.

48. Be able to operate audio-visual equipments.

49. Have well defined goals and purposes that can be suggested as they relate to the transfer of knowledge to students.

7. Membership in Professional Organizations

50. Be knowledgeable of leaders in the field.

51. Demonstrate interest in civic organization through membership and participation.

52. Operate in a political arena.

8. Development of New Knowledge and Programs

53. Work with state Department of Public Instruction and other agencies in articulating programs.

54. Understand the significance of cooperative education programs (not internships) at the college level.

55. Work closely with the state board in program planning.

56. Recruit promising students for programs.

57. Attempt to broaden one's understanding in several subject matter areas so as to relate one's knowledge and experiences to the field of industrial education.

58. Understand industrial education programs in secondary and post-secondary schools and articulate them with your program.

59. Write complete B.Ed. and M.Ed. degree programs.

60. Develop a safety program in compliance with OSHA standards.

61. Serve as a consultant to a foreign country in establishing guidelines and plans for vocational technical education.

62. Innovate new ideas.

9. Understanding Current Trends and Role of Industrial Education

63. Use current and historical data to predict the future development in industrial education and industrial technology.

10. Reading and Evaluating Research Report

64. Read broadly outside of industrial education.

65. Interpret data and understand research findings.

11. Understanding Federal and State Laws Pertaining to Industrial Education

66. Be aware of funding sources at the State and Federal levels.

12. Following Administrative Practices and Principles

67. Evaluate college or university staff.

68. Make mature judgments and decisions for the total Department of Industrial Education.

69. Be able to negotiate with senior academic administrators for capital, space, and supplies.

70. Demonstrate synthesizing abilities as the head of the Department of Industrial Education.

71. Be able to overcome restrictive fundings.

72. Understand organizational and administrative behavior to aid in more efficient operation.

73. Prepare report materials for a crediting association.

74. Prepare long range plans and reports for administrative purposes.

13. Communicating with Industry

75. Work with industry for donations of equipment and materials.

76. Be able to hold a job in industry of trade area before being employed as a teacher or administrator.

77. Obtain materials support from industry.

78. Coordinate a cooperative education with industry.

79. Participate in interim nonacademic industrial employment.

14. Developing Curricula

80. Develop very definite procedures for actual curriculum implementation and subsequent evaluation.

81. Organize and develop a curriculum around concepts relative to industrial arts.

15. Relating Technological Advances and Current Events to Classroom Instruction

82. Instill prospective teachers with a pride in craftsmanship.

83. Use current and historical education and industrial technology.

84. Advise students regarding certification and degree requirements.

16. Demonstrating a high level of knowledge and technical performance in certain area(s) of specialization

85. Be knowledgeable in the history of technology.

86. Be able to understand an engineering level approach within the instructors area of specialization.

87. Attempt to broaden one's understanding in several subjects.

88. Have technical knowledge far beyond that needed to function effectively as a teacher in a secondary school.

89. Demonstrate a high level of skill in your area so you can not only tell but show.

90. Teach technical competencies.

17. Understanding the meaning, philosophy, and history of Industrial Education

91. Accept divergent philosophies and methodologies.

92. Be flexible in philosophy and belief.

93. Be well grounded in current philosophies affecting the social climate of this country as well as others.

94. Have a good understanding of the history of philosophy.

18. Diagnosing and prescribing instruction based upon student needs and abilities

95. Be able to understand the needs of most students and relate the instructional material or content to their needs.

96. Discuss with employers of graduates what can be done to improve future graduates.

97. Be able to consult student and hold individual conferences.

98. Counsel students concerning their problems (both school and out-of-school).

99. Advise students in scheduling and course work.

100. Be able to identify with student problems.

101. Understand advisory functions when working with incoming and/or curious students (potential students) dealing with transfer possibilities in institutional settings.

19. Professional Knowledge

102. Understand OSHA and other safety regulations and procedures.

103. Create alternative methods of problem solving.

104. Be able to identify a body of knowledge for industrial arts subject area.

105. Be well read in a variety of areas.

106. Be able to speak French.

107. Show the interrelationship and interdependence of all forms of vocational education, industrial arts, and technical education as one entity.

108. Keep abreast of the latest hardware for audio-visual media to support the instructional process.

109. Design software to support instructional delivery system.

110. Understand publishing procedures.

111. Be able to identify problems in the Industrial Arts Department as they occur.

112. Have a great deal of common sense.

113. Be able to identify and analyze a problem.

114. Increase one's knowledge of political processes for survival.

20. Professional Attitudes

115. Demonstrate a basic desire to teach and be understood by students assigned to him/her.

116. Have true commitment for the occupation of teaching.

117. Resist administrative efforts to be lead away from teaching into administration.

118. Cooperate with doctoral student research projects.

119. Complete questionnaires sent by doctoral students.

120. Demonstrate the ability to place graduates.

121. Serve as a consultant.

122. Advise students.

123. Adapt oneself to change.

124. Coordinate field experiences.

125. Be interested in educating people.

126. Exhibit willingness to change.

127. Maintain rapport with students.

128. Be as fair as one can possibly be.

129. Be interested in students.

130. Be adaptable to changing needs.

131. Have a desire to work long and hard.

132. Show a love for his profession.

133. Demonstrate an optimistic, positive attitude.

134. Be willing to go above and beyond the call of duty in serving his profession.

135. Demonstate good work habits.

136. Maintain a sense of humor.

21. Evaluating and Purchasing Physical Facilities, Supplies, and Equipment

137. Maintain and repair equipment.

138. Be able to order materials.

139. Obtain laboratory supplies and equipment other than through an organized budget system.

140. Know how to order, specify, and maintain laboratory equipment.

141. Evaluate existing physical facilities.

142. Demonstrate the ability of purchasing and budgeting supplies and equipment.

22. Communication Skills

143. Demonstrate the ability of interpersonal communications.

144. Be able to present ideas clearly and concisely.

145. Demonstrate skills both written and visual.

23. Miscellaneous

146. Utilize available support units, e.g., visual aid production labs and computer services.

147. Be able to understand one's abilities and skills.

148. Understand teacher liability problems.

149. Demonstrate good personal-social traits.